A.

Registered No.
BRITISH CONSULATE,
JEDDAH.

PILGRIM'S PASSPORT.

GOVERNMENT OF INDIA.

Name (in English and Urdu.)	Father's name.	Residence.	Occupation.	Age.	* Distinctive Marks.	General Remarks.

* To be filled up for male pilgrims only.

This Passport, issued by the authority of the Viceroy and Governor General of India in Council, Requests and Requires all those whom it may concern to afford the persons above-named going on pilgrimage to the Hedjaz all needed assistance and protection.

By order of the Governor-General of India in Council,

*Countersigned at*________________
*this*_____*day of*____________188____
(*Sd.*)________________________
Magistrate or Commissioner of Police,
or Political Agent,

Secretary to the Government of India, in the Home Department.

NOTICE TO PILGRIMS.

1. The British Government having been informed by the Turkish Government that the authorities in the Hedjaz will not allow pilgrims from British India to land without a Passport, this Passport is issued to enable pilgrims to comply with the orders of the Turkish Government.
2. This Passport is supplied on request made by or on behalf of the intending pilgrim, but no fee is charged for issuing the same.
3. The British Government does not undertake to bring back pauper pilgrims from the Hedjaz.
4. The British Government has no desire to interfere with the liberty of the pilgrims, but warns its subjects that they should not undertake the pilgrimage if they have not sufficient pecuniary means for the expenses of the journey to the Hedjaz and back to India.
5. On arrival at Jeddah the holder of this Passport should present it to the British Consul for registration.
6. This Passport having been granted solely for the convenience of the pilgrim, the holder thereof is entitled to apply to the British Consul at Jeddah for assistance in case of difficulty.
7. For the convenience of pilgrims not knowing English, this Passport is accompanied with a full translation of this notice in Urdu and Arabic.

B.

Certified that the bearer, who states that his name is
and that he is a resident of , *has passed through*
on his way to the Hedjaz; and that no complaints have been made regarding
his conduct while in British Territory.

Dated at ________________________

this *day of* 188 . *Commissioner of Police.*

Fee Rs. 2.

NOTIFICATIONS.—SANITARY.

Simla, the 19*th July* 1882.

No. 220.—In exercise of the powers conferred by Section 46 of the Native Passenger Ships Act, No. VIII of 1876, the Governor-General in Council is pleased to make the following addition to Rule VII of the Rules published in Notification No. 112, dated 27th April 1882:—

"In the case of ships engaged in the coasting trade, and carrying passengers on short voyages from port to port who do not ordinarily cook food on board, the officer granting the certificate B may, in his discretion, reduce the number of cooking ranges to such number, not being less than two, as may to him seem adequate to the requirements of the passengers."

EDUCATION.

The 19*th July* 1882.

No. 409.—The Governor-General in Council has been pleased to reappoint the Hon'ble A. Wilson to be Vice-Chancellor of the University of Calcutta, with effect from the date of the expiry of his original appointment.

The following orders, issued by the Government of India, Department of Finance and Commerce, are republished for general information:—

NOTIFICATIONS.

Simla, the 15*th July* 1882.

No. 2467.—Mr. D. M. Barbour, B.C.S., is appointed to officiate, until further orders, as Secretary to the Government of India in the Department of Finance and Commerce.

The 21*st July* 1882.

No. 2534.—The following Addendum to the Codes of the Financial Department is published for general information:—

CIVIL LEAVE CODE.

Page 198.

Section 157, *Rule* 2.

Insert the words "for reasons stated" *between* "may allow" *in Proviso V and after* "may" *in Proviso VI, respectively.*

The following orders, issued by the Government of India in the Military Department, are republished for general information:—

Simla, the 21*st July* 1882.

INDIA OFFICE. 13*th June*, 1882.

HER Majesty has approved of the following promotions among the officers of the Staff Corps and Indian Military Services made by Governments in India:—

BENGAL MEDICAL ESTABLISHMENTS.

To be Brigade Surgeons.

Surgeon-Major James Howard Thornton. Dated 1st March 1882.
Surgeon-Major John Jones, M.D. Dated 1st April 1882.

To be Surgeons-Major.

Dated 1st April 1882.

Surgeon James Frederick Parry McConnell.
Surgeon Joseph O'Brien, M.D.

* * * * * * *

The following orders, issued by the Surgeon-General with the Government of India, are republished for general information:—

NOTIFICATIONS.

Simla, the 19th June 1882.

No. 33.—Third grade Assistant Surgeon Hira Lal Nan of the Supernumerary List is permitted to resign the service.

The 30*th June* 1882.

No. 34.—Third grade Assistant Surgeon Raj Kumar Roy of the Supernumerary List is dismissed the service.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, AUGUST 2, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India in the Home Department, are republished for general information :—

NOTIFICATIONS.—JUDICIAL.

Simla, the 25th July 1882.

No. 1061.—The services of Mr. W. Macpherson, of the Bengal Civil Service, and of Babu Mohendro Nath Bose, of the Subordinate Judicial Service, are replaced at the disposal of the Government of Bengal, with effect from the 1st proximo.

The 26th July 1882

No. 1070.—The Hon'ble Romesh Chunder Mitter, B.L., a Judge of the High Court of Judicature at Fort William in Bengal, took over charge of the duties of the Chief Justice of the Court from the Hon'ble Sir R. Garth on the forenoon of the 14th instant.

The following orders, issued by the Government of India in the Department of Finance and Commerce, are republished for general information :—

NOTIFICATIONS.

Simla, the 27th July 1882.

No. 2734.—Mr. D. M. Barbour, B.C.S., is confirmed in the appointment of Secretary to the Government of India in the Department of Finance and Commerce, with effect from the 23rd July 1882.

No. 2662.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

Read again—

Resolution in the Department of Finance and Commerce, No. 2679, dated 31st August 1878, laying down rules to regulate the powers of Local Governments to sanction special additions to salaries which are not authorised by any general or special orders of the Government of India.

Letter in the Department of Finance and Commerce to the Accountant-General, Bombay, No. 3377, dated 4th October 1881, stating, in reply to an enquiry by the Accountant-General, that the sanction of the Government of India was requisite to the grant of additional remuneration to a public officer, in the shape of a local allowance, for the performance of duties alien from those of his proper office, whether such allowance was payable from Imperial or Provincial Revenues, and whatever the emoluments of the officer might be.

Letter in the Department of Finance and Commerce, to the Government of Bombay, No. 2303, dated 31st December 1881, stating that the orders in the letter to the Accountant-General, Bombay, No. 3377, dated 4th October 1881, were not intended to interfere with the combination of two or more sanctioned offices in one officer in cases in which allowances for such combination were regulated in accordance with rules in Chapter VII of the Pay and Acting Allowance Code.

Read—

Letter from the Government of Bombay, No. 2128, dated 9th June 1882, referring for orders certain questions which have been raised by the Accountant-General, Bombay, in connection with the above-mentioned orders of the 4th October and 31st December 1881.

RESOLUTION.—His Excellency the Governor-General in Council has considered it necessary to lay down the following rules regarding the powers of Local Governments in sanctioning the appointment of one officer to hold two or more appointments at the same time, and the grant of allowances in such cases. The orders of the 4th October and 31st December 1881, read in the preamble, are hereby withdrawn :—

(1) A Local Government may grant a local allowance to an officer paid from Provincial Revenues, provided the officer's total emoluments, including the local allowance, do not exceed Rs. 250 a month.

(2) A Local Government cannot, without the previous sanction of the Government of India, appoint an officer to hold two appointments as a permanent arrangement, unless the pay of the appointments is a Provincial charge, and unless their aggregate pay does not exceed Rs. 250 a month. A Local Government may, as a temporary measure, appoint one officer to two or more appointments without the sanction of the Government of India, and in such case the emoluments of the officer will be regulated by the Rules in Chapter VII of the Pay and Acting Allowance Code.

(3) If a local allowance is sanctioned by the Government of India on the understanding that it shall be drawn by an officer who may perform the duties for which it is granted, the sanction of the Government of India will not be required a second time in the case of any particular officer to whom the Local Government may assign the duties.

2. The foregoing rules shall not have retrospective effect in respect of allowances now drawn, or appointments already made, so far as regards present incumbents; but they must be strictly applied in the future whenever there is a change of incumbents, and the sanction of the Government of India should be obtained in every future case in which it may be necessary to do so under the rules now prescribed.

ORDERED that this Resolution be published in the *Gazette of India*, and that it be communicated to—

The several Departments of the Government of India.
The several Local Governments.
The Director-General of the Post Office of India.
The Comptroller-General and all Accountants-General.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, AUGUST 9, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following order, issued by the Surgeon-General with the Government of India, is republished for general information :—

NOTIFICATION.

Simla, the 3rd July 1882.

No. 35.—Third grade Assistant Surgeon Gokul Chundra Bhaduri, of the Supernumerary List, is permitted to resign the service.

F. B. Peacock,
Offg. Secretary to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, AUGUST 16, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India in the Department of Finance and Commerce, are republished for general information:—

NOTIFICATIONS.

Simla, the 4th August 1882.

No. 2899.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

Read—

- Note by Mr. T. C. Hope, Secretary to the Government of India in the Department of Finance and Commerce, on the Iron Industry in India.
- Despatch to Her Majesty's Secretary of State for India, No. 175, dated 1st July 1881, recommending the purchase of the Bengal Iron Works.
- Despatch from Her Majesty's Secretary of State for India, No. 40, dated 25th August 1881, sanctioning the purchase.
- Report on the Bengal Iron Works, by Ritter C. von Schwarz, dated 26th October 1881.
- Telegram from the Government of Bengal in the Public Works Department, dated 5th April 1882, reporting conclusion of negotiations for purchase.
- Letter to the Government of Bengal, Public Works Department, No. 494, dated 19th April, regarding temporary charge of the works, and calling for report on condition and utilisation of works.
- Letter from the Government of Bengal, No. 2343E, dated 14th July 1882, furnishing reports by Ritter C. von Schwarz, with memorandum by the Chief Engineer.

RESOLUTION.—The Government of India have, for some time past, had under special consideration the importance of developing the iron industry in India. The advantages which such development would afford to both the State and the public,—by cheapening the cost of railway construction and maintenance, and of works for improving the water-supply; by substituting metal for more perishable materials in buildings; by reducing the home charges and their concomitant loss by exchange; by creating for the population non-agricultural employment; and by increasing the means for profitable investment of capital,—are too well known to require lengthened exposition.

2. Regarding the capabilities of the Indian iron measures to fulfil all that is required of them, no doubt can reasonably be entertained. Moreover, they lie, for the most part, in convenient proximity to either ample supplies of coal or forests available for use in the preparation of the ore. In Assam, Kuch Behar, Burma, and the Kumaon ranges the prospects are promising to a greater or less extent. In Lower Bengal, the Raniganj district, Sonthalia,

The Calcutta Gazette.

WEDNESDAY, AUGUST 16, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India in the Department of Finance and Commerce, are republished for general information :—

NOTIFICATIONS.

Simla, the 4th August 1882.

No. 2899.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

Read—

Note by Mr. T. C. Hope, Secretary to the Government of India in the Department of Finance and Commerce, on the Iron Industry in India.

Despatch to Her Majesty's Secretary of State for India, No. 175, dated 1st July 1881, recommending the purchase of the Bengal Iron Works.

Despatch from Her Majesty's Secretary of State for India, No. 40, dated 25th August 1881, sanctioning the purchase.

Report on the Bengal Iron Works, by Ritter C. von Schwarz, dated 26th October 1881.

Telegram from the Government of Bengal in the Public Works Department, dated 5th April 1882, reporting conclusion of negotiations for purchase.

Letter to the Government of Bengal, Public Works Department, No. 494, dated 19th April, regarding temporary charge of the works, and calling for report on condition and utilisation of works.

Letter from the Government of Bengal, No. 2343E, dated 14th July 1882, furnishing reports by Ritter C. von Schwarz, with memorandum by the Chief Engineer.

RESOLUTION.—The Government of India have, for some time past, had under special consideration the importance of developing the iron industry in India. The advantages which such development would afford to both the State and the public,—by cheapening the cost of railway construction and maintenance, and of works for improving the water-supply; by substituting metal for more perishable materials in buildings; by reducing the home charges and their concomitant loss by exchange; by creating for the population non-agricultural employment; and by increasing the means for profitable investment of capital,—are too well known to require lengthened exposition.

2. Regarding the capabilities of the Indian iron measures to fulfil all that is required of them, no doubt can reasonably be entertained. Moreover, they lie, for the most part, in convenient proximity to either ample supplies of coal or forests available for use in the preparation of the ore. In Assam, Kuch Behar, Burma, and the Kumaon ranges the prospects are promising to a greater or less extent. In Lower Bengal, the Raniganj district, Sonthalia,

and Chutia Nagpur; in the Central Provinces, Sambalpur and Chanda; in Central India, the ranges near Gwalior; and in the Punjab, numerous localities, are found to be specially endowed with all the requisites for successful production. In quality the ores are mostly found to be extremely pure; and where the proportion of phosphorous and other impurities is large, recently invented processes have removed all obstacle to their successful elimination.

3. Under the circumstances above described, it may be accepted as proved that India possesses the means of supplying all her wants in respect of cast-iron, wrought-iron and steel, and that such supply could be produced remuneratively on a strictly commercial basis. The establishment of iron works to be owned and worked by the State is open to grave objections, both economic and practical, and being likewise unnecessary, need not be discussed at length. Nothing appears to be necessary in order to attract private enterprise to so eligible an opening except the collection and diffusion of sufficient information, and the grant of such facilities as the State may legitimately and reasonably afford to a young and growing industry.

4. Private enterprise in this matter, however, must evidently be on a large scale, and not confined to one locality alone. The distances in India are so great, and the railway system now so extended, that the cost of conveying material to the spot where it is needed is an important factor in every calculation. It has been proved that, unless mills were established in four different localities, the cost of sending old rails and tyres to be worked up afresh would exceed that of obtaining new ones from England. A similar conclusion has been formed as to the gain by substituting iron sleepers for wooden ones. Raniganj, the Punjab, and the Central Provinces appear to be the localities in all of which extensive operations would be necessary in order to meet early necessities of the case. Whether these localities should be occupied by different Companies or by one is a matter of detail, but the aggregate capital required would obviously be large. The amount required might perhaps be beyond the local resources of the Calcutta or Bombay money market, and the investment uncongenial to those in Europe with whom those markets are connected in their ordinary mercantile transactions. England must likewise be looked to, and those capitalists in England whose knowledge and resources are specially directed to the iron industry.

5. Towards the development of the industry in the Raniganj district, the attention of the Government has in the first instance been directed, in consequence of the fact that a private Company was established a few years ago near Barrakur, but after a short time fell into difficulties from causes which need not be related, and was obliged to suspend operations. After carefully investigating the causes of failure, the Government of India came to the conclusion that the only way in which the works could be, at any early date, placed in the hands of experienced persons having an adequate command of capital, was by an intermediate purchase on the part of the State.

6. The "Bengal Iron Works" have consequently been purchased for the sum of Rs. 4,30,761. His Excellency the Governor-General in Council is now pleased to announce that they will be retransferred for that sum, together with any further indispensable outlay, to any parties who may establish satisfactorily that they are in the possession of sufficient skill and resources, and *bonâ fide* prepared to carry on the manufacture of iron and steel upon a scale commensurate to the probable needs of that portion of British India which is within reasonable distance of the works. His Excellency in Council will further be prepared to enter into an engagement, if so desired, to take annually for ten years, at fixed prices to be previously agreed upon, not less than a certain weight of the Company's manufactures. This weight will be determined with reference to the average requirements of the Government for railways and other public works in the territory to the north and east of the East Indian Railway from Calcutta to Mogul Serai. With a view to facilitate the formation of a judgment on the prospects of the enterprise, the reports by Ritter C. von Schwarz, which are specified in the heading to this Resolution, will be made public, and further explanations or information will, as far as practicable, be afforded; but it must be distinctly understood that the Government decline to be responsible for the accuracy of any calculations or estimates so put forward.

7. In order to ascertain more fully the capabilities of the Chanda district of the Central Provinces, Ritter C von Schwarz was some months ago deputed to the locality, and has submitted a very full and able report, which is also now made public, under a similar reservation. The Government of India are now engaged in ascertaining the probable demand for iron and steel within a suitable radius of Chanda, and in comparing the merits of that locality with those of others in the Central Provinces. Any information which may become available will be published in due course. Similar investigations will be pursued in the Punjab and other parts of India, as circumstances may permit.

8. In view of the importance of fully developing at the earliest possible date the resources of India in coal and iron, and of the necessity of unity and vigour of action to this end, His Excellency the Governor-General in Council is pleased to direct that the Department of Public Works of the Government of India shall be the initiating Department in relation to the utilisation of these minerals, subject to the customary general control of the Department of Finance and Commerce in matters of contract and expenditure, and to the usual consultation of the Revenue or Political Department on any matters in which they may be respectively concerned. Those Departments, on the other hand, as also all Local Governments and Administrations, should, by the collection of information or otherwise, co-operate with the Department of Public Works towards the attainment of the end in view.

ORDERED that this Resolution be communicated to all Local Governments and Administrations, and to the Public Works, Revenue and Agricultural, and the Political Departments of the Government of India; and that it be published, together with the reports of Ritter C. von Schwarz, in the *Gazette of India.*

Report on the reopening of the Bengal Iron Works for the production of 80 tons castings per 24 hours.

WHEN in 1875 the Bengal Iron Works Company first opened, English pig-iron was selling in Calcutta at Rs. 60 per ton, whilst the cost of production of the pig-iron made at the Company's works was Rs. 65. Within two years this was reduced to Rs. 40; but meanwhile, or at least by 1878, English pig-iron was quoted in Calcutta at Rs. 29 per ton. The Company being unable to further force down the cost price of their pig-iron the failure of the undertaking became manifest, and resulted in the closing of the works in 1879. At this present time English pig-iron of the quality which used to be produced at the Bengal Iron Works is selling in Calcutta at Rs. 35 per ton: therefore still Rs. 5 below the cost price arrived at by the Company.

As since the closing of the works the prices of the raw materials (iron ores, coal, and limestone) have not fallen, and as, on the other hand, the cost of labour has risen, the success of the reopening of the Bengal Iron Works depends on decreasing the cost of production through improved arrangements in some directions and a simplification of working procedure in others. To arrive at the desired result the following measures are proposed:—

1. The substitution of certain machinery for certain manual labour formerly employed, and the introduction of certain simplified, yet improved, methods of working—both having for their object a saving of material and cost of labour.
2. Arrangements for increasing the capabilities of the works for the quantity of production, by means of which, in an indirect way, the cost of labour, of management, wear and tear, &c., is diminished, as the expenses on these are distributed over a larger amount of produce.
3. Arrangements for utilising the collateral produce of the works.

In the following pages the proposed improvements will be treated of, viz. of what they consist and how in the present case they can be introduced expeditiously, cheaply, and effectively.

It is evident that in the main the present arrangements will be maintained as much as possible, and that our task will consist more in completing these than in carrying out essential alterations.

I.—Alterations in the Blast-furnaces.

1. The height of each blast-furnace and their hoist is to be increased by 6 feet, viz. making their total height from bottom to top 61 instead of 55 feet, and the inner diameter of the furnace hearth to be increased from 5 feet to 6 feet.

2. The total square section of the nozzles should be raised from 20 to 35 square inches, the wind pressure from 5 to 8 inches mercury, and the number of the twyers should be doubled, viz. the 3, as at present, should be increased to 6.

These alterations will increase the production capacity of the furnaces, which in general depends on the dimensions of the furnaces.

Next to the dimensions of the furnace, it is the square section of the nozzles, the wind pressure, and the temperature of the same, which when raised increase the productive capacity of the blast-furnace; nevertheless these must remain in a certain ratio to one another, and must be kept within certain limits, dependent on the inner dimensions of the furnace.

The doubling of the twyers has for its object a more effective distribution of the wind, which becomes more necessary as the square section of the furnace before the twyers is to be enlarged.

3. The water-twyers should be made of bronze instead of cast-iron (as at present), water-boxes for cooling the hearth should be introduced, the angle of inclination of the boshes should be enlarged to 80°, and the inner form of the furnaces rounded off, so as to avoid all sharp angles and sudden transitions, in order to secure a uniform descent of the melting column and to avoid a derangement of function through a blocking up of the melting column.

It may be mentioned here that the blast-furnace No. 1 of the Bengal Iron Works, although its inner dimensions had been theoretically correctly chosen, was within scarcely two years so much burnt away inside and got so much out of shape that it had to be laid cold, which drawback was caused by nothing else than the sharp transitions between shaft and boshes, the steep angle of inclination of the boshes, and the total absence of water cooling of the hearth.

Blast-furnaces of a correct inner form should work at least from eight to ten years without any appreciable interruption. The object of using bronze instead of cast-iron for the water-twyers is to achieve greater durability of the same, which, as experience has shewn, is in this case of special importance, as through faulty twyers water enters the blast-furnace, which it is well known deranges its function, and may even cause dangerous explosions. Besides, the bronze twyers when used up have still the value of their metal, whilst old cast-iron twyers are of little value as material.

4. It is further recommended to introduce, in connection with the blast-furnaces, Lürmann's arrangement for drawing off the slags instead of the obsolete system employed in the Bengal Iron Works, to allow the slags to flow over the dam-plate by means of the cinder notch. It would lead me too far to set forth all the advantages of this system: a full description of it may be seen in the technical works of Dr. John Percy, Dr. Wedding, and others. Suffice it to say that this system may be seen already in use in most blast-furnaces of England, Germany, and America.

5. The adoption is recommended of "Parry's cup and cone" for the furnace top and of all other arrangements for collecting, cleaning, and conducting the blast-furnace gases to the hot-blast ovens and steam-boilers. "Parry's cup and cone" serves for closing the furnace top for the purpose of drawing off the gases, and at the same time also to facilitate a uniform and correct serving of the blast-furnace with the raw materials, namely, iron ore, coke, and limestone.

The apparatus combines simplicity with usefulness, and has also the advantage over all other apparatus of the same kind that it renders possible so to serve the blast-furnace that the workmen are in no way oppressed either by heat, dust, or by the poisonous gases always given off by the blast-furnace when under serving.

Parry's cup and cone was first applied to a blast-furnace at Ebbev Vale in South Wales, and has thence successfully spread to England, Germany, and America.

In connection with Parry's cup and cone, an arrangement is proposed for leading off and cleansing the blast-furnace gases from dust, consisting of sheet-iron pipes, in which, at the bends, dusting-chambers are inserted.

The action of the dusting-chambers is to suddenly increase the section of the gas-conduit, whereby the velocity of the gases is reduced and the opportunity is given to the impurities to settle or precipitate themselves.

The most suitable form of this arrangement is the so-called "S apparatus:" it is made of sheet-iron riveted so as to be airtight.

The bottom in one part does not join the sides (*vide* sketch in the margin), but is bent in a slanting form, so that a connection exists between the inner space and the outside air in the manner of the communicating tube.

The lower part of the apparatus is filled with water, which serves as a separation between the gas and the atmosphere. The here precipitated dust of the gases may from time to time be removed with a shovel through the opening C. The water serves at the same time as a safety-valve, as in case of too high a pressure in the gas-pipe it is forced out.

This cleansing apparatus has been successfully applied to all the new blast-furnaces in the east of France, and has already been copied in Germany, England, and Austria.

The apparatus for burning the gases have to be applied separately to each furnace and each boiler.

Their arrangement aims chiefly at mixing thoroughly the furnace gases with the air necessary for burning them, and to conduct this mixture over a lighting fire, in order that the gases may be kept constantly burning and the danger of their being extinguished be prevented, as in this case an explosive mixture of air and gases would be evolved.

Blast-furnace gases consist chiefly of carbonic oxygen gas (CO) (*vide* "Report on the Bengal Iron Works," page 2), which, to reach the desired effect, has to be completely burnt to carbonic acid (CO_2). An arrangement answering the foregoing requirements may be seen in several new iron works in England and Germany. It was first introduced in Neustadt in Hanover, and is constructed on a principle of Faber du Faur.

6. It is also recommended to connect with each blast-furnace a reserve apparatus for heating the wind (*vide* "Report on the Bengal Iron Works, page 3").

7. It is further advised to introduce apparatus for utilising the blast-furnace slags in the fabrication of cement, artificial stones, and "slag wool." (For particulars on this subject, please see "Report on the Bengal Iron Works," page 2).

II.—Apparatus required for preparing the Raw Materials.

1. Three ore-crushers for the mechanical breaking up of the iron ore and limestone. (For particulars please see "Report on the Bengal Iron Works," pages 2 and 3.)

2. Belgian coke ovens with a coal washing apparatus.

The Barrakur coal has the following chemical composition:—

Fixed carbon	65	per cent.
Carbon combined on hydrogen	6·60	,,
Hydrogen	4·94	,,
Oxigen and nitrogen	9·32	,,
Sulphur	0·44	,,
Moisture	3·65	,,
Ashes	10·05	,,

This coal with so high component parts of carbon and hydrogen, although its percentage of ashes is rather high, must be considered as well suitable for metalurgical purposes.

The coke made of this coal at the local coal-mines has 16 to 18 per cent. of ashes, and sells at more than double the price of the coal from which it is made.

Although the contents of fixed carbon in this coal is 65 per cent., and that of ashes 10·05 per cent. (therefore the percentage of unvolatile matters about 75), the coke produced from it is only 50 per cent., this shortcoming being due, not to the quality of the coal, but to the primitive arrangements for making the coke. The arrangement consists in open kilns, where the access of atmospheric air is not to be despised; but on the other hand under such conditions a considerable portion of the fixed carbon, the most valuable component of the coal in regard to the production of coke, is driven off along with other volatile substances as carbonic oxygen gas (CO). The outturn of coke is therefore poor, and the quantity of ashes considerably increased.

It may here be observed that a large proportion of ashes in coke reduces its value very much for purposes of its use in the blast-furnace. Ashes consist chiefly of silicic acid ($S_i O_2$), which being almost infusible requires a larger addition of limestone to melt it, and as a matter of course occasions a greater consumption of fuel. Besides, with coke rich in ashes, a smaller quantity of carbon is distributed through a larger volume of matter, whereby the pyrometric effect of every description of fuel is diminished. In the Bengal Iron Works the production of one ton pig-iron used to require the consumption of 36 cwts. of coke and 32 cwts. of limestone—a very unfavourable condition of working. It will therefore be necessary to introduce a more favourable system of coke-making, namely, first to wash the coal, that is, to free it as much as possible from the substances producing the ashes, and then to "distil" it in closed furnaces.

For the treatment of coal in making coke, the Belgian coke-furnaces (system François and Rexroth) would give in one case the best results. These furnaces yield 95 per cent. of the non-volatile components of the coal, and they are particularly suitable for India on climatic grounds, as the coke is removed from the furnace by a machine, by which the workmen are spared the enormous radiating heat. There is also a saving of coke through the quickness of the operation of removing it, as under a slow process some of it is lost by combustion.

These coke-furnaces require no special firing; they heat themselves with their own gases, which are led in channels around them, and having done their duty to the furnaces, they are collected into a common channel—say for 25 furnaces one—and are then utilised for heating steam-boilers.

With this system of furnaces, the Barrakur coal may be made to yield coke containing from 6 to 8 per cent. ashes only, instead of 16 to 18 per cent. as now, which would raise its value as a fuel for the blast-furnace by 20 per cent., and the consumption of coke per ton of pig-iron would be reduced from 36 to 28 cwts.

It should also be mentioned that the refuse of coal in the washing-basins, a sort of coal-mud, may be utilised for heating the drying-furnaces in the foundry and for other subordinate heating purposes. (Please see "Report on the Bengal Iron Works," page 3, Drying-furnaces.)

III.—Blowing-engine.

It is recommended that a second blowing-engine of the capacity of the present be acquired.

The amount of wind which must be forced into a blast-furnace depends on the quantity of coke which is burnt in it in a given time, and upon the percentage of carbon in this coke.

It must here be remembered that the whole of the carbon in the coke must be reduced to carbonic acid (CO_2) to produce the desired effect in the blast-furnace.

The present blowing-engine may be estimated at a maximum effect of 5,980 cubic feet air per minute; but this is only half the requirements, which can be shewn to be 11,344 cubic feet per minute. Therefore, if the two blast-furnaces are to turn out 80 tons of pig-iron per 24 hours, a second blowing-engine of the same effect as the present one is required. The calculations to the above will be found in Appendix No. 1 (page 81).

2. The steam-boiler establishment belonging to the blowing-engines also will have to be proportionally increased to 440 horse-power, as the present

one is only sufficient to yield 100 horse-power. For calculations please see Appendix No. 2 (page 33).

It must be mentioned here that the Bengal Iron Works Company never worked the two blast-furnaces at the same time, which is chiefly due to the insufficiency of their boiler establishment, being only able to furnish the motive power for the production of 20 tons of pig-iron per 24 hours, although the blowing-engine, blast-furnaces, hoist and chimney, &c., are corresponding to 40 tons production for 24 hours.

3. With the employment of a second blowing-engine the dimensions of the blast-conduit and regulator of blast will have also to be proportionally enlarged.

IV.—Storeyard for Iron Ore, Limestone, and Fuel.

To keep up a sufficient stock of the raw materials in a proper way a better arrangement for their deposit is required. How this is to be managed may be seen from the annexed plan No. 1 (*vide* mixing plans and filling bank).

Under the circumstances before us, a large stock of the raw materials is not required, as they are to be had in the immediate neighbourhood of the iron works, and there is no fear of interruption in their regular delivery. Without regard to the dead capital lying on large stores, there is a difficulty in controlling them. They take up a large space and cause other inconveniences.

As regards iron ores and limestone, a store for three months is ample; of coal not more than a monthly store should be kept, as coal loses, through long exposure to the air, greatly in its value, in consequence of the evaporation of the valuable carburetted hydrogen gases, especially during the dry season.

V.—Alterations in the Foundries.

1. It has already been pointed out in my "Report on the Bengal Iron Works" (page 3) that the casting direct from the blast-furnace, namely, without remelting the pig-iron in the cupola furnace, is recommended.

To attain this it is advisable to remove the standing foundry No. I close to the blast-furnaces (*vide* plan No. 1). This can be easily done, as the foundry shops mentioned only consist of a roof of corrugated sheet-iron supported by pillars and rolled beams. Most of the pillars are of wood, and should be replaced by cast-iron pillars. As, however, the foundry shop No. I alone would not be sufficiently large for the production of 80 tons sleepers per day, and the foundry No. II, being built of stone, cannot be removed, the enlargement of foundry No. I and the erection of a new one (*vide* plan No. I) will become necessary.

2. The foundry shop No. II can be especially arranged for making pipes. The necessary alterations in the drying-furnaces and the other arrangement for casting and tiering pipes have already been treated of in my "Report on the Bengal Iron Works" (pages 3 and 4).

3. The cupola furnaces attached to the foundry remain as a reserve in order to remelt the pig-iron produce from the blast-furnaces on Sundays and holidays (as the working of the blast-furnaces cannot be stopped on such days) and to utilise the scraps of the foundries.

A slight alteration in their construction is recommended according to a principle invented by Fauler in Freyburg (Bavaria). To explain this invention in detail would lead too far. Suffice it to say (*a*) that it has proved practicable since the last five years; (*b*) that its virtues lie in the saving of 15 per cent. of fuel; and (*c*) that it can be cheaply introduced in the present arrangement of the cupola furnaces.

4. It is further recommended to use moulding-machines for making sleepers.

These machines serve to lift the pattern out of the sand *strictly vertical*, which can never be correctly accomplished by hand, in consequence of which much labour and time is lost in repairing the mould.

These machines are especially adapted where many castings of *one* pattern are required, which is therefore suitable in our case.

5. The introduction of an apparatus to gain the "wash-iron" out of the used sand of the foundry and the pigbed shed of the blast-furnaces is advised.

This apparatus is an inexpensive arrangement, by which the greater part of the spilled cast iron can be regained; it renders two per cent. of the production of castings, namely about 1½ tons "wash-iron" per diem.

VI.—Alteration in the Chief Water-supply.

In consequence of the proposed enlargement of the foundry and the blast-furnaces, the cooling apparatus for the latter, and the erection of coke-furnaces, &c., the present arrangement for water-supply will not be sufficient.

Besides this, the present way of supplying water is so complicated a one that it can bear being simplified by this opportunity. It consists now in pumping out the water from the Barrakur river by means of a large pumping-engine erected on its banks, and leading it through cast-iron pipes of 10-inch diameter for a distance of about 1¾ miles to a tank near the iron works. From there the water is pumped up to a height of about 10 feet into a second smaller tank, from whence it is led by means of pipes to wells situated near the blast-furnaces and the foundries. Here it is pumped for the *third* and last time into the high-water reservoirs, from whence at length it is led to its destination. To avoid this round-about way it is recommended to erect a high-water reservoir for about 15,000 cubic feet contents on the border of the large tank, and to lead it from thence directly to its destination.

As the required quantity of water is rather large, and the difference between the water levels of the tank (from where the water is to be pumped *out*) and the high-water reservoir (where it is to be pumped *in*) will be not more than about 30 feet, *centrifugal pumps* are recommended.

VII.—Buildings and Out-houses.

1. The greater part of the out-houses belonging to the works were built of mud walls with thatched roofs, and are now in a tumble-down condition, leaving only the stones lying about, which will do for rebuilding them.

2. For native workmen it is recommended to make a bathing-tank, which can be easily done by enlarging the present one.

3. The erection of huts for about 600 coolies is also advised.

4. A boundary wall round the works should also be erected in a substantial way, so that it answers the purpose. Although it is rather expensive, most of the iron works are provided with one, as the damage caused by running away of workmen, unbidden visitors, and stealing, justifies the greater expense of a wall.

This wall must be about 7½ feet high, and must be provided with sharp objects (the simplest ones being blast-furnace slags) built in on the top, in order to prevent the scaling of the wall.

VIII.—European Workmen.

With regard to European workmen for iron working in general, I refer to the "labour question" treated of in my report on Chanda (page 10). To start the works in order to produce 80 tons castings per 24 hours the following European workmen have to be brought out from Europe:—

1. One blast-furnace foreman.
2. Four first-men for the blast-furnaces.
3. Four second-men ditto
4. Four third-men ditto
5. Two workmen for the coke-furnaces.

IX.—Amount of Production.

The cast-iron parts for one sleeper (broad gauge railway) weigh, including jaws, about 188lb. The sleepers lie at a distance of one yard (centre to centre) from each other: this gives a consumption of 148 tons of cast-iron per running mile railway.

Therefore, with the proposed arrangements (which allow the production of about 80 tons of sleepers per 24 hours), it would be possible to yield the requirement of *sleepers for about half a mile of railway per day*.

Approximate estimate for the improvements and repairs of the Bengal Iron Works for production of 80 tons of cast-iron sleepers and other castings per 24 hours (vide *plan No.* 1).

I.—FURNACES AND MACHINERY—		
a.—For the Blast-furnaces—		Rs.
3 ore-crushers		7,200
Derrick and steam-engine for the same		2,500
Raising of the blast-furnaces and their hoist by 6 feet, and repairs on the casing of the furnaces		14,000
"Parry's cup and cone" on each blast-furnace		2,500
Twyers, nozzles, water-boxes, dam-plates, and other cast and wrought-iron parts for the furnaces		3,500
Apparatus for catching, purifying, and distributing the blast-furnace gases to the hot-blast ovens and steam-boilers ...		25,000
New inside lining for the two blast-furnaces		3,500
2 new hot-blast ovens		8,000
10 new steam-boilers		
Boilers	Rs. 45,000	
Masonry and mountings	,, 15,000	
		60,000
Repairs on the standing steam-boilers and hot-blast ovens ...		7,000
Increasing of the wind-conduit, regulator of blast, steam and water pipes, &c.		10,000
1 new blowing-engine with two water-pumps, including foundations		40,000
Cinder and ore tubs, scales, tools, &c.		14,000
Apparatus for the gaining of "wash-iron"		3,000
b.—For the Coke-furnaces—		
Coal-washing apparatus, including steam-engine, washing-basins, &c.		35,000
50 Belgian coke-furnaces for the production of 120 tons coke per 24 hours, including steam-engine, tools, &c. ...		72,000
c.—For the Foundries—		
15 moulding-machines for cast-iron sleepers		15,000
Changes on the cupola furnaces and providing them with water-cask elevators		2,500
Alteration in the arrangement for casting and tiering pipes ...		7,500
Moulding-boxes, patterns, ladles, tools, &c.		10,000
About 2,000 running feet small railway, including turn-tables ..		4,500
Repairs on the standing machinery and shifting off the principal railway		4,000
d.—For the Water-supply—		
1 high water reservoir on the banks of the water-tank for 15,000 cubic feet contents		8,000
2 centrifugal pumps, including steam-engine, transmissions, and fittings of the reservoir		4,500
II.—BUILDINGS AND EARTHWORKS—		
a.—For the Blast-furnaces—		
Ore crush-house		5,000
New mixing place and filling banks		18,000
1 blowing-engine house		7,500
1 new chimney, 120 feet high		4,000
Repairs on the standing chimney and providing it with iron anchorage		1,000
2 slag-wool houses		1,000
b.—Coke-furnaces—		
Building and chimney for the coal-washing machinery ...		7,500
c.—For the Foundries—		
Transport and increase of the standing foundry shop No. I and replacement of the wooden by cast-iron pillars		9,400
Erection of a new foundry hall close to the blast-furnaces ...		24,600
d.—Out-houses—		
Repairs on the standing out-houses and furniture for office and dwelling-houses for European workmen		15,000
1 large bathing-tank for native workmen		2,000
Native huts for about 600 coolies		6,000
Boundary wall		8,000
III.—WORKING CAPITAL—		
Amount invested in stores		70,000
Reserve funds		1,00,000
IV.—ENGAGEMENT AND BRINGING OUT OF 16 EUROPEANS		8,000
Total ...		6,50,200

Recapitulation.

		Rs.
Cost of furnaces and machinery	... ...	3,63,200
,, of buildings and earthwork	... ...	1,09,000
Working capital	... ...	1,70,000
Engagement and bringing out of 16 European workmen	...	8,000
Total	...	6,50,200

APPROXIMATE COST OF PRODUCTION.

1.—*Cost of One Ton Grey Pig-iron.*

		Rs.
1·95 tons iron ore, at 12 annas per ton	... ...	1·46
1·40 ,, coke, at Rs. 8 per ton	... ...	11·20
1·10 ,, limestone, at Rs. 4 per ton	... ...	4·40
Wages	... ...	3·94
Management, wear and tear, &c.	... ...	7·00
Total	...	28·00

2.—*Cost of One Ton Cast-iron Sleepers cast directly from the Blast-furnace.*

1·05 tons grey pig-iron, at Rs. 28	... ...	29·40
0·40 ,, coal for heating boilers, at Rs. 2-8	... ...	1·00
Wages	... ...	12·60
Management, wear and tear	... ...	4·00
Total	...	47·00

3.—*Cost of One Ton Cast-iron Pipes cast from the Cupola-furnaces.*

1·08 grey pig iron, at Rs. 28	... ...	30·24
0·40 tons coal ,, 25	... ...	1·00
0·10 ,, coke ,, 8	... ...	0·80
Wages	... ...	16·46
Management, wear and tear, &c.	... ...	5·50
Total	...	54·00

REMARKS.—In the calculation of the costs of production, the *actual* expenses are only taken into account, *excluding* interest of capital invested in the iron-work.

2. The prices are given in rupees per ton at the works.

Comparative Statement shewing the Difference of Prices of Cast-iron Goods in different Railway-stations.

NAMES OF STATIONS.	CAST-IRON RAILWAY SLEEPERS.			CAST-IRON PIPES.		
	English prices.	Our cost prices.	Difference in our favour.	English prices.	Our cost prices.	Difference in our favour.
Howrah	59·0	53·7	5·3	80·0	60·7	19·3
Barakur	65·7	47·0	18·7	86·7	54·0	32·7
Dinapore	75·7	57·0	18·7	96·7	64·0	32·7
Agra	98·0	80·0	18·0	117·0	87·0	30·0
Gwalior	107·0	89·0	18·0	126·0	96·0	30·0
Lahore	117·0	99·5	18·0	136·5	106·5	30·0
Moolten	127·0	109·0	18·0	146·0	116·0	30·0

REMARKS.—The prices are given in rupees per ton including freight; the latter is calculated at the rates for first-class railway goods.

Appendices.

APPENDIX No. 1.—The quantity of air required per minute is calculated by the equation

$$Q = 1{\cdot}1\,Ap. \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad \text{No. 1,}$$

where Q is the quantity of air in cubic feet to be introduced in the blast-furnaces per minute ;
A is the consumption of coke per 24 hours expressed in tons ;
p is the proportion of carbon in the coke.

If, as proposed, Belgian furnaces with washing apparatus will be used for the manufacture of coke from the Barrakur coal, the proportion of carbon in the coke will be $p = 92$, and the consumption of coke per 24 hours will be $A = 112$ tons ; the outturn of pig-iron with this fuel by the two blast-furnaces being assumed at 80 tons per 24 hours.

By substituting these values in equation No. 1 we get—

$Q = 1{\cdot}1 \times 112 \times 92 = 11{\cdot}344$ cubic feet of air required per minute for both blast-furnaces together.

The effect of the present blowing-engine in the Bengal Iron Works is calculated by the equation

$$9' = \propto f.v.n. \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad \text{No. 2,}$$

where $9'$ is the quantity of air in cubic feet which can be delivered by the blowing-engine per minute ;
f the inner section of each cylinder in square feet : in the present instance $f = 23$;
v the speed of the piston in feet per minute, the maximum in the present instance being assumed at 200 ;
n the number of cylinders : in the present instance $n = 2$, and ;
$\propto$ the working effect of the blowing-engine inclusive wind-conduit, which may be assumed to be in this case 0·65, namely 35 per cent of the theoretical effect being lost through leakage in the wind-conductors, especially in the hot-blast ovens.

Substituting these values in equation No. 2, we get the maximum effect of the present blowing-engine $9' = 0{\cdot}65 \times 23 \times 200 \times 2 = 5{,}980$ cubic feet per minute ; that is to say, about half of what is required, which, as found before, is 11,344 *cubic feet* per minute.

APPENDIX No. 2.—The necessary motive power for the two blowing-engines is calculated by the equation

$$N = \frac{1}{G\propto} \times 0{\cdot}0045\,P.Q. \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad \text{No. 3,}$$

where N is the requisite number of horse-power to drive the two blowing-engines,
G the working effect of the steam engine,—in our case 0·75 per cent.;
$\propto$ the working effect of the blowing-engines and wind-conduit ;—as before 0·65 per cent.;
P the pressure of the wind on the nozzles ;—in our case $P = 4$lb per square inch ; and
Q the quantity of air in cubic feet per minute ; as previously calculated = 11,344.

These values substituted in equation No. 3, we get

$N = \frac{1}{0{\cdot}75 \times 0{\cdot}65} \times 0{\cdot}0045 \times 4 \times 11344 = 420{\cdot}5$ horse-power, being the requisite motive power for the two blowing-engines. Besides the blowing-engines, there is required the necessary motive power for driving the hoist and the feeding-pumps for the boilers, which consume about 20 horse-power : therefore altogether a steam-boiler establishment of 440 horse-power will be required to serve the whole machinery belonging to the blast-furnaces.

The standing steam-boiler establishment consists of 7 "egg-ended boilers," each of which having a total length of 28 feet and 5 feet diameter, representing a "fire surface" (the part of the boilers in contact with the fire) of 230 square feet per boiler.

Considering the construction of these boilers, a "fire surface" of 16 square feet can be calculated for each horse-power : therefore a real effect of about 100 horse-power can be furnished by the seven standing boilers together ($\frac{230 \times 7}{16} = 100$).

But as this motive power answers only for the production of 20 tons pig-iron per 24 hours, the erection of a second steam-boiler establishment is required to furnish the necessary effect of 440 horse-power.

It must be observed that two steam-boilers must be kept as a reserve in case those in use require cleaning or repairing.

RITTER C. SCHWARZ.

BARRAKUR, 16*th June* 1882.

The Manufacture of Wrought-iron and Steel at the Bengal Iron Works.

FOR the manufacture of wrought-iron and steel, and especially for the production of rails, beams, girder, and ship-plates, etc., on a large scale, the introduction of the *basic* Bessemer process is recommended. With this process the contents of phosphorus in the pig-iron (produced from the Barrakur iron ores) can be reduced from 1·36 to 0·04 per cent, and therefore a quality of wrought-iron and steel produced which is suitable for the production of steel rails, rolled beams, etc. (An analysis of the pig-iron produced by the Bengal Iron Work Company is shewn in my Report on the Bengal Iron Works, page 3.)

The spiegeleisen (specular cast-iron) for the production of steel in the Bengal converter cannot be obtained from the Barrakur iron ores on account of their impurities and their too small contents of manganese: "spiegeleisen" has therefore to be imported.

It is of great importance in the *basic* Bessemer process to procure a suitable basic fire-proof material for the inner lining of the converter, as imperfect material for this purpose would cause costly interruption of the work by the wearing out of the lining too quickly. Besides, the making of basic fire bricks is very expensive, and the renewing or repairing of the inner lining of a Bessemer converter is a disagreeable and tedious labour, as the workmen have to suffer great heat and the work has to be done carefully and exactly.

Dolomite (magnesium limestone) has proved the best material in practice for the purpose, and such is to be found near Ramlallpur, about seven miles south of Raneegunge, and near Purda (lat. 22° 59′ 15″: long. 86° 37′ 45″).

Dolomite of an excellent quality also occurs in the stream beds near Darjeeling, where it is rolled down from a range of hills composed of dolomite, which occurs just beyond the British boundary in Bhutan; the same rock also occurs east of Buxa in British territory (Mem. G. S. T., Vol. XI, page 83).

The following is an analysis of this dolomite:—

Carbonate of lime (Co. O. Co_2)	60·5
„ of magnesia (Mg. O Co_2)	38·7
	0·3
	99·5

Although this dolomite will be rather expensive to procure, it may pay to use it for the converter lining for the reasons explained. The pig-iron has to be remelted in cupola furnaces, as it is not sufficiently pure and regular for this process to be led directly in a liquid state from the blast-furnaces into the converter.

Amount of production.—It is a general rule to produce as large a quantity as possible in a Rail's rolling-mill, in order to distribute the high expenses for workmen and establishment combined with such an undertaking over a great amount of production.

As we are not depending here on vegetable fuel, but all raw materials are to be had in unlimited quantities, it is the manual aptitude and practice of the workmen serving the rolling-mill and the converting department which furnishes the basis for the quantity of production. In England and America the most astonishing results in this direction have been attained. The average outturn of a *single* Rail's rolling-mill is there 440 tons of finished rails per 24 hours; but exceptionally also 600 tons have been turned out in the same time when making "double headers" of 80lb per yard.

It is very doubtful whether such results can be attained here; therefore the annexed calculations of the cost of production are for security based on a production of 200 tons of finished rails per 24 hours.

It must be mentioned that in a Rail's rolling-mill, also rolled beams, rolled sleepers, girder, and ship-plates, and other rolled iron or steel goods of the stronger kind, can be produced if the necessary cylinders (rollers) are provided.

To provide the necessary pig-iron for the production of 200 tons of finished rails per diem, it is not advisable to use the existing blast-furnace establishment, this being only constructed for a production of 40 tons per diem for both blast-furnaces, whilst about 200 tons of pig-iron are wanted.

These blast-furnaces should be put in thorough order for making pig-iron for castings only, for which purpose they were originally built. For the production of the pig-iron for the rolling-mill, it is recommended to erect a new blast-furnace establishment consisting of two blast-furnaces on the declivity of a small hill, which is at a distance of about 1,000 yards from the existing establishment. The railway siding can be prolonged uphill to a length of about 1,000 yards, rising to a maximum height of 50 feet, in order to form a viaduct from which the raw materials can be thrown over for the purpose of concentrating the stock in a comparatively small space (*vide* Report on the Bengal Iron Works, page 1).

Each of these new blast-furnaces can be constructed for an outturn of 100 tons of pig-iron per 24 hours, giving at the same time better results than the existing blast-furnaces would yield with regard to the consumption of fuel and cost of labour, management, wear and tear, etc., for well-known reasons.

This establishment should be constructed in such a manner that an increase of it by a third or fourth blast-furnace could be accomplished (if the requirements of the Rail's rolling-mill should be augmented) without interfering with the original system, and without disturbance to the work of the existing establishment.

The scraps of the rails yield a suitable material for the manufacture of wire, as is done in Cleveland. A Bessemer establishment producing daily 200 tons of rails can in this wise turn out 20 to 25 tons of wire in the same time.

The slag of the basic Bessemer process, owing to its contents of phosphate of lime, can be used as manure, as is the practice in Germany.

The puddling and welding process.

For the production of bar, hoop, and façon iron of the smaller kind, the introduction of the puddling and welding process is recommended. The contents of phosphorus in the pig-iron can be reduced in the puddling-furnace from 1·36 to 0·25 per cent., and thus renders a material suitable for the manufacture of bar-iron of the so-called "refined" quality.

The existing blast-furnaces can be arranged for the outturn of about 80 tons of white pig-iron per 24 hours, which would yield the necessary material for the production of about 62 tons of small bar-iron, façon-iron, etc. It may be mentioned that for the production of small façon-iron (double T V iron, bridge-rails, etc.), a small contents of phosphorus is necessary in order to enable the iron to fill out the complicated shapes of the calibres of the rollers; the circumstances in our case are therefore especially adapted for this purpose.

Railways and Tramways.

As the iron ores of Barrakur are to be had in unlimited quantities in the immediate neighbourhood of the works, and as they can be obtained by simple surface digging, the erection of a tramway for their transport is not necessary; they can be cheaper transported by carts.

Limestone occurs in Pachete and Hansapathar, at a distance of about eight and ten miles from the works. For the making of 200 tons rails and 80 tons castings per diem (as proposed), about 320 tons of this limestone would be required daily: it is therefore advisable to construct a tramway for its transport. This tramway, however, would have to cross the Damuda river, and this can be done by means of a "causeway," as a bridge over that river (at least for the present) would be too expensive.

The river can in this wise be crossed for seven and a half months in the year, and a store of limestone for the remaining four and a half months (during the rainy season) has to be kept at the works.

The transport of coal to the works, and that of finished goods from the works, is managed by the East Indian Railway (Seetarampore–Burrakur line), with which the works are connected by means of a siding.

APPROXIMATE COST OF PRODUCTION.

(1) *Cost of One Ton Grey Pig-iron for the Bessemer Process—*

	Rs.
1·95 tons iron ore, at 12 annas per ton	1·46
* 1·20 „ coke, at Rs. 8 „	9·60
1·10 „ limestone, at Rs. 4 „	4·40
* Wages	3·54
* Management, wear and tear, &c.	6·00
Total ...	25·00

(2) *Cost of One Ton Bessemer Steel Rails—*

1·22 tons grey pig-iron, at Rs. 25	30·50
0·06 „ spiegeleisen, at Rs. 120	7·20
0·12 „ coke, at Rs. 8	0·96
1·20 „ coal iron, at Rs. 3	3·60
0·20 „ burnt lime, at Rs. 8	1·60
Wages	9·64
Management, wear and tear, &c.	9·50
Total ...	63·00

(3) *Cost of One Ton Bessemer Iron Rails—*

1·28 tons grey pig-iron, at Rs. 25	32·00
0·12 „ coke, at Rs. 8	0·96
1·20 „ coal, at Rs. 3	3·60
0·25 „ burnt lime, at Rs. 8	2·00
Wages	9·34
Management, wear and tear, &c.	9·10
Total ...	57·00

(4) *Cost of One Ton White Pig-iron for the Puddling Process—*

1·95 tons iron ore, at 12 annas	1·46
1·05 „ coke, at Rs. 8	8·40
1·10 „ limestone, at Rs. 4	4·40
Wages	3·44
Management, wear and tear, &c.	6·30
Total ...	24·00

(5) *Cost of One Ton Puddled Bar and Façon-iron—*

1·25 tons white pig-iron, at Rs. 24	33·00
2·50 „ coal, at Rs. 3	7·50
Wages	11·70
Management, wear and tear, &c.	12·80
Total ...	62·00(?)

---

* The consumption of coke in a blast-furnace per one ton of pig-iron is smaller when the production in a given time is greater; also the expenses for wages, management, and wear and tear diminish with the increase of production.

Comparative Statement shewing the Difference of Prices of Iron and Steel Goods in different Railway-stations.

NAMES OF STATIONS.	BESSEMER STEEL RAILS.			BESSEMER IRON RAILS.			PUDDLED BAR IRON, "REFINED."		
	English prices.	Our cost prices.	Difference in our favour.	English prices.	Our cost prices.	Difference in our favour.	English prices.	Our cost prices.	Difference in our favour.
Howrah	85·0	69·7	15·3	70·0	63·7	6·3	115·0	68·7	46·3
Burrakur	91·7	63·0	28·7	76·7	57·0	19·7	121·7	62·0	59·7
Dnapore	101·7	73·0	28·7	86·7	67·0	19·7	131·7	72·0	59·7
Agra	124·0	96·0	28·0	109·0	90·0	19·0	152·0	95·0	57·0
Gwalior	133·0	105·0	28·0	118·0	99·0	19·0	161·0	104·0	57·0
Liahore	143·5	115·5	28·0	128·5	109·5	19·0	171·5	114·5	57·0
Mooltan	153·0	125·0	28·0	138·0	119·0	19·0	181·0	124·0	57·0

Approximate estimate of an Iron Work producing 200 tons Bessemer Steel Rails per diem (see *plan No. III*).

I.—FURNACES AND MACHINERY—

a.—For the blast-furnaces—

	Rs.	Rs.
5 ore-crushers		12,000
2 blast-furnaces, each producing 100 tons of pig-iron per 24 hours—		
Cast and wrought-iron parts	1,30,000	
Masonry	30,000	
		1,60,000
1 hoist for iron ores, coke, and limestone		25,000
2 blowing-engines, each for 12,500 cubic feet air per minute, with two water-pumps—		
Machinery	1,20,000	
Foundation	20,000	
		1,40,000
6 large hot-blast ovens—		
Cast and wrought-iron parts	30,000	
Masonry	10,000	
		40,000
Apparatus for catching, purifying, and cleaning the blast-furnace gases and distributing them to the steam-boilers and hot-blast ovens		40,000
Regulator of blast, blast main, stream, and water-pipes		25,000
Steam boilers for 1,100 horse-power—		
Boilers	1,10,000	
Masonry and mounting	40,000	
		1,50,000
2 water-reservoirs, each for 20,000 cubic feet contents		20,000
Cinder and ore tubs, scales, tools, &c.		20,000

b.—For the Bessemer and Rolling-mill—

	Rs.	Rs.
3 large cupola furnaces (system Fauler) for remelting the pig-iron, including hydraulic lift—		
Cast and wrought-iron parts	20,000	
Masonry	4,000	
		24,000
2 small cupola furnaces (for melting the "spiegeleisen"), including lift—		
Cast and wrought-iron	5,000	
Masonry	1,500	
		6,500
2 Bessemer converters, each for six tons contents—		
Cast and wrought-iron	18,000	
Masonry	4,000	
		22,000
3 drying-furnaces with cranes—		
Cast and wrought-iron	2,500	
Masonry	2,000	
		4,500
6 gas-furnaces for reheating the Bessemer ingots and blooms, including cranes—		
Cast and wrought-iron parts	30,000	
Masonry	11,000	
		41,000
1 blowing-engine for the converting department—		
Machinery	36,000	
Foundations	6,000	
		42,000
1 hydraulic crane for ten tons maximum weight—		
Machinery	7,500	
Masonry	2,000	
		9,500

	Rs.	Rs.
3 hydraulic cranes for four tons maximum weight—		
Machinery	5,000	
Masonry	1,500	
		6,500
1 water-pump with accumulator for the hydraulic machinery—		
Machinery	10,000	
Masonry	3,000	
		13,000
1 blowing mill with 250 horse-power steam-engine and 45 tons fly-wheel—		
Machinery	70,000	
Masonry (foundation)	8,000	
		78,000
1 Rail's mill, with 300 horse-power steam-engine and 40 tons fly-wheel—		
Machinery	90,000	
Foundation	11,000	
		1,01,000
1 steam-hammer for cutting Bessemer blooms, including crane—		
Machinery	15,000	
Foundation	5,000	
		20,000
24 steam-boilers, each for 30 horse-power—		
Boilers	72,000	
Masonry and mountings	24,000	
		96,000
2 water-reservoirs, each for 15,000 cubic feet		15,000
2 water pumps, including steam-engine		6,000
3 steam-boiler feeding-pumps, including steam-engines ...		4,800
1 large scale for weighing the Bessemer blocks—		
Machinery	2,500	
Masonry	1,500	
		4,000
Rails, finishing plant, circular saws, drilling, straightening, and slotting engines, &c.		30,000
Cooling beds for rails		5,000
1 45-horsepower steam-engine for the rails finishing plant—		
Machinery and transmissions	5,500	
Foundation	700	
		6,200
Steam, water, and air pipes, and two Roots blowers ...		16,000
Fans, railways, wagons, ingots, moulds, scales, tools, &c. ...		14,000
1 large lathe for the cylinders		5,000
c.—For the Coke-furnaces—		
2 coal-washing apparatus, including steam-engines, disintegrators, basins, &c.		70,000
100 Belgian coke-furnaces, including steam-engine, tools, &c. ...		1,42,000
II.—BUILDINGS—		
a.—For the Blast-furnaces—		
Ore crush-house		8,000
Mixing place and filling bank for ore, limestone, and coke ...		30,000
2 blowing engine-houses		24,000
Building for the hoist		12,000
Foundry hall		22,500
2 chimneys, each 120 feet high		8,000
Channels and drains		6,000
b.—For the Bessemer Mill—		
Bessemer and rolling-mill		3,00,000
2 chimneys, 120 feet high		8,000
Channels, drains, &c.		6,000

	Rs.
c.—For the Coke-furnaces—	
Building and chimney for the coal-washing machinery ...	12,000
d — Workshops and out-houses—	
2 blacksmith's shops, with interior arrangements ...	25,000
Store-rooms	12,000
Scale and porter-house, including scale	5,000
Dwelling-houses, barracks, offices, &c.	60,000
Native huts for about 1,000 coolies	10,000
Boundary wall	12,000
III.—WORKING CAPITAL—	
Amount invested in stores	1,50,000
Reserve funds	1,00,000
IV.—EARTHWORK—	
Levelling, ditches, tanks, &c.	20,000
V.—TRAMWAYS AND RAILWAYS—	
10 running miles tramway for bringing the limestone, at Rs. 12,000	1,20,000
Prolongation of the railway siding for 1,000 yards ...	50,000
VI.—ENGAGEMENT AND BRINGING OUT OF 70 EUROPEANS ...	35,000
Total ...	24,49,500

Recapitulation.

Cost of furnaces and machinery	14,14,000
Do. of buildings and earthworks	5,80,500
Do. of tramways and railways	1,70,000
Do. of bringing out Europeans	35,000
Working capital	2,50,000
Total ...	24,49,500
An iron-work producing daily 200 tons Bessemer steel rails costs ...	24,49,500

Conclusion.

The local circumstances with regard to the quantity and quality of the raw materials at the Barrakur Iron Works are specially adapted for the production of rails, rolled beams, girder, and ship-plates, and other rolled goods of the stronger kind on a large scale, and for the production of ordinary castings, as railway-sleepers, pipes, pillars, &c., as well as for the manufacture of bar and façon iron of "refined" quality.

The raw materials are to be had in unlimited quantities, and cheap enough to produce iron and steel goods of the above kind at competition and profitable prices if the manufacture of them is conducted on modern principles.

With the proposed improvements and arrangements, namely,—

(1) Putting the existing blast-furnace establishment and foundries into thorough order for the production of castings,
(2) The erection of a new establishment for making rails, etc.,

the daily outturn of the whole works would be—

(1) 80 tons ordinary castings (principally railway-sleepers), and
(2) 200 tons rails, beams, and other rolled goods of the *stronger* kind.

The production of puddled bar and façon iron, if desired, could be begun on a much smaller scale than the production of rails, and would still pay. The two existing blast-furnaces could be arranged—*one* for the production of *grey* pig-iron for castings, and the *other* for the manufacture of *white* pig-iron for the puddling process. In this wise there could be turned out daily—

(*a*) 20 tons of ordinary castings, and
(*b*) 18 tons of bar and façon iron.

The cost of this arrangement would be about 5 lakhs (five lakhs) of rupees in all. Owing to the geographical situation of the works, and considering the railway freight for iron goods prevailing in India, the most profitable sale districts for iron and steel goods made at Burrakur would be Bengal, the North-Western Provinces and Oudh, and they could also be sold in Central India and Punjab at competition prices.

BARRAKUR, *the* 30*th June* 1882. (Sd.) R. C. VON SCHWARZ.

Approximate estimate for the improvements and repairs of the Bengal Iron Works for the production of forty tons of cast-iron sleepers and other castings for **24** *hours* (vide *plan No. II*).

I.—FURNACES AND MACHINERY—		
		Rs.
a.—For the Blast-furnaces—		
2 ore-crushers		4,800
Derrick and steam-engine for the same		2,000
"Parry's cup and cone" for each blast-furnace		2,500
Repairs on the casing of the blast-furnace		3,000
Twyers, nozzles, water-boxes, dam-plates, and other cast and wrought-iron parts for the blast-furnace		2,500
Apparatus for catching, purifying, and distributing the blast-furnace gauges to the hot blast ovens and steam boilers ...		20,000
New inside lining for the two blast-furnaces		3,500
1 new hot-blast—blast-ovens		4,000
4 new steam-boilers—		
	Rs.	
Boilers	18,000	
Masonry and mountings	6,000	
		24,000
		66,800
Repairs on the standing steam-boilers and hot-blast ovens ...		7,000
Increasing of the wind-conduit, steam and water-pipes ...		5,000
Cinder and ore tubs, scales, tools, &c.		10,000
Apparatus for making "wash-iron"		3,000
b.—For the Coke-furnace—		
Coal-washing apparatus, including steam-boilers, steam-engine, and washing-basins		25,000
25 coke-furnaces for the production of 60 tons coke per 24 hours, including steam-engine, &c.		42,000
c.—For the Foundries—		
8 moulding-machines for cast-iron sleepers		8,000
Changes in the cupola furnaces and providing them with water-cask elevators		2,500
Alteration in the arrangement for casting and tiering pipes ...		7,500
Moulding-boxes, patterns, ladles, tools, &c.		7,000
About 1,500 feet small railway, including turn-table ...		3,700
d.—For the Water-supply—		
1 high-water reservoir on the banks of the tank for 10,000 cubic feet water		6,000
2 centrifugal pumps (each 3 inches diameter of delivery pipe) including steam-engine, transmissions, and fittings for the reservoir		3,500
II.—BUILDINGS AND EARTHWORKS—		
a.—For the Blast-furnace—		
1 crush-house		4,000
Mixing place and filling bank		12,000
Anchorage and repairs on the chimney		1,000
Arrangement for making slag-wool		1,000
b.—Coke-furnace—		
Building and machinery for the coal-washing machinery ...		7,500
c.—Foundries—		
Transport and increase of the foundry shop No. 1 and replacement of the wooden by cast-iron pillars		9,400

	Rs.
d.—Out-houses—	
Repairs on the standing out-houses and furniture for office and dwelling houses for European workmen	15,000
1 large bathing-tank for native workmen	2,000
Native huts for about 400 coolies	4,000
Boundary wall	8,000
III.—WORKING CAPITAL—	
Amount invested in stores	40,000
Reserve funds	70,000
IV.—ENGAGEMENT AND BRINGING OUT OF 16 EUROPEANS ...	8,000
Total ...	3,78,400

Recapitulation.

Cost of furnaces and machinery	1,96,500
Do. buildings and earthworks	63,900
Working capital and reserve funds	1,10,000
Cost of bringing out Europeans	8,000
Total ...	3,78,400

(Sd.) R. C. VON SCHWARZ.

The 20th June 1882.

REPORT ON THE BENGAL IRON WORKS.

Parts of works.—The works consist essentially of two blast-furnaces, each capable of producing 20 tons of grey pig-iron for castings per 24 hours, and of a casting establishment of two separate buildings, with all necessary machinery, finishing, and repairing workshops; also of offices, store-rooms, scale-houses, water-reservoirs, dwellings, &c.

Situation.—The situation of the works may be described in general to have been well chosen, as the principal raw materials, namely, the iron ores, coke and limestone are found in the immediate neighbourhood and in sufficient quantities. It would, however, have been better if the works had been built on the Burrakur river, which is at a distance of about 1¾ miles, as the water required for them is not to be found in the present situation, but must be led to them from that river.

This shortcoming has rendered necessary the establishment of a special and expensive pumping engine with boilers, and a water conduit of about 8,500 feet in length, consisting of 10-inch cast-iron pipes. This water conduit alone may have cost Rs. 50,000, which might have been saved if the works had been built immediately on the river.

Raw materials.—The *iron ores* are brown hematite, and consist of 47 per cent. of metallic iron on an average, or 78 per cent. of hydrate sesquioxide of iron $(2S_{e2}\ O_3,\ 3\ H\ O)$: the impurities are 12 per cent. silicic acid $(S_1\ O_2)$ and 6 per cent. aluminia $(Al_2\ O_3)$, the rest being protoxide of manganese $(Mn\ O)$, phosphoric acid $(P\ O_5)$ and traces of sulphur. The iron ores are found close to the iron works and on the surface of the ground; there is, therefore, no expensive mining arrangements necessary; they can be delivered at the iron works for 12 annas per ton, inclusive of all costs.

The *coke* is made likewise near the works, as the coal mines are near. The coke is well burnt, but contains a good deal of ashes. It costs when delivered at the iron works from Rs. 8 to Rs. 10 per ton, according to quality.

The *limestone* is obtained from a distance of above five miles. It consists of 71½ per cent. of cacium carbonate $(Ca\ O\ Co_2)$, 17 per cent. other alkalies, and 11½ per cent. silicic acid $(Si\ O_2)$. This limestone, on account of the heavy contents of silicic acid, cannot be considered very satisfactory for the blast-furnace process; in fact, through the 12 per cent. silicic acid in the ores the heavy percentage of ashes in the coke (consisting also chiefly of silicic acid) and the 11½ per cent. of the same in the limestone itself, the consumption of limestone is so heavy that it reduces the value of the great contents of the iron in the ore.

In general, however, the above raw materials are good enough, and their prices so exceedingly low as to have justified the establishment of an iron work in that place for their utilisation.

Blast-furnaces.—The blast furnaces are on a well approved Scotch system and the engines belonging to them, such as the blowing engine, hoist, water-pumps, &c., are well built and well preserved. There is, however, this shortcoming, that there is no suitable arrangement for concentrating the stock of the principal iron materials (ores, coke, and limestone) in a comparatively small space. With the great quantities required of these materials, there should have been built behind the furnaces a viaduct, at least 45 feet high, on which to convey these materials and throw them over. With the present arrangements they are spread over a large space, which occasions a considerable expense for bringing them to the blast-furnace, and other inconveniences.

Blowing engine.—The blowing-engine is double cylindrical, vertical, of approved construction, and in good preservation. For the adjustment of the blast there is a small receiver.

Hoist.—The hoist for the ores, coke, and limestone is a costly, well constructed machine, in good preservation, and is worked by a horizontal double-cylinder steam-engine. It may be observed that for this purpose a so-called "water cask elevator," of a very cheap construction, would have done as well. This arrangement has been introduced in many European iron works with success, where in winter time its working is not hindered by the formation of ice; it is therefore suitable for India.

Steam-boilers and chimney.—For the working of the machinery of the blast furnace, there are seven cylindrical boilers, each about 26 feet long and 5½ feet in diameter; these are all built in with masonry connectively, instead of each one or two having their own bed.

The chimney is 120 feet high, and is reported to be of an average width of 10 feet; in shape it is square (instead of round or octangular), which is for well known reasons objectionable; it is also not provided with any anchorage, and is therefore cracked in several places.

Before the works can be started again this chimney would have to be repaired and provided outside with proper iron anchorage.

Hot blast-ovens.—For the heating of the blast, there are provided two Whitwell apparatus, one for each blast-furnace. The addition of a third apparatus as a reserve would be very desirable, as without it, when one of the apparatus would require repairs or to be cleaned, which frequently occurs, the blast-furnace connected with it would have to be worked with cold blast, which requires more fuel and occasions irregularity in the work.

Blast-furnace gases.—With reference to the blast-furnaces of the establishment, it is inconceivable why the utilisation of the valuable gases evolved as fuel has been entirely neglected, and were allowed to escape. The gases from a blast furnace consists chiefly of about 30 per cent. carbonic oxygen gas (Co), 3 to 4 per cent. heavy carburetted hydrogen gas ($C_2 H_4$), and about 60 per cent. nitrogen, the rest being carbonic acid, water, steam, &c. This gas mixture, when purified, is powerful enough and in sufficient quantities to heat all the boilers and the hot blast-ovens belonging to the blast furnaces from which the gases have been taken. In the present instance 30 *tons of coal* would have been *daily* saved. The necessary arrangement for catching, purifying, and distributing the blast-furnace gases could be easily and cheaply applied, and is urgently recommended to be introduced, before the works are started again.

Bast-furnace slag.—Neither is there any arrangement for the utilisation of another subsidiary product, namely, the blast-furnace slag. Blast furnace slags can be converted into cement, artificial stones, and into so-called "slag wool." It consists of about 38 per cent. silicic acid ($Si O_2$), 22 per cent. aluminia ($Al_2 O_3$), 31 per cent. lime ($Ca O$), the rest being magnesia, gypsum, and other unimportant constituents.

To make the *cement*, the hot liquid slag is run into water, when it is granulated; the granulated mass is then ground into powder, and this again mixed with one to two per cent. of pure limestone or chalk and burnt; the result is a cement of a superior quality.

For the production of *artificial stones*, the granulated blast furnace slag is mixed with a little lime cream; it is then pressed in the desired moulds and dried.

"*Slag wool*" is produced by leading water steam, of a pressure of about two atmospheres, under a right angle, into a thin ray of slag; the produced slag wool looks like cleaned cotton and its used for the packing of steam pipes, the wadding of ice cellars, and in general as an insulator against heat.

Ore crusher.—There is no machine provided in the iron works for crushing the iron ores and the limestone; this used to be done by coolies. An ore crusher, a simple and inexpensive machine, would have done this work cheaper and certainly more effectively.

Pig-iron.—The product of the blast furnace was 40 tons of grey pig-iron for castings per 24 hours for both blast-furnaces The pig-iron was run into sand and allowed to get cold; it was partly sold in this shape and partly remelted in the foundry.

The following is an analysis of it :—

Iron metallic ...	..	90·58 per cent	Silicon ...	...	4 13 per cent.
Carbon combined	...	0·14 ,,	Phosphorus ...	...	1·36 ,,
,, graphite	...	2·70 ,,	Sulphur ...	...	0 12 ,,
Manganese ...	...	0·97 ,,			

Foundry.—The buildings holding the foundry are too far situated from the blast-furnaces to allow of the pig-iron to be transferred to the buildings direct in a liquid state, for being cast in the moulds without being remelted in the cupola furnace.

It is an old erroneous notion that the pig-iron taken *direct* from the blast-furnace furnishes castings of an inferior quality than when remelted in a cupola furnace. The only disadvantage which can be alleged against the direct casting, namely, want of uniformity in the casting, can be cancelled by suitable arrangements and manipulations during the process of casting To explain and to prove this would lead us too far. Suffice it to mention that the process of direct casting from the blast-furnace without the intervention of the cupola furnace has lately been practised with success in several English and German iron works, and for a long time in Austria and Sweden.

The remelting of the pig-iron should be resorted to only for the purpose of utilizing the Sunday production of the blast-furnaces and the scraps of the foundry, or for the production of special qualities of cast-iron for certain purposes, such as pottery castings or ornamental objects. In general, the remelting of the pig-iron serves only for the convenience of the management of the works, or to remedy irregularities; for when the blast-furnace is irregularly worked, unequal qualities of pig-iron are produced, which of course render the direct casting process impossible. Through careless or incorrect management in working the blast-furnace, sometimes too much carbonised and sometimes too little carbonised pig-iron is turned out, both unsuitable for castings; but through alloying both together they can be profitably used for castings by means of the cupola furnace.

Cupola furnaces.—For remelting of the pig-iron the Bengal Iron Works have four cupola furnaces of the approved system, "Ireland." The blast is effected by a ventilator, and a Roots blower, the latter decidedly preferable to the former. The defect about the cupola furnaces is the absence of a lift for pig-iron and coke. These materials were carried to the furnace top by coolies upon a staircase. Two simple water-cask elevators (one for each couple of furnaces) would remedy this shortcoming at a small expense.

Foundry shops.—The foundry workshops are in two separate buildings—one for light, the other for heavy castings; the latter is therefore provided with five cranes. Connected with the foundry is a workshop for finishing the castings. This workshop contains lathes of varying dimensions, two drilling machines, one planing machine, one pipe-testing machine, with all appurtenances, and also a movable crane for serving all this machinery. To work the whole of the workshop machinery there is a horizontal steam-engine with boilers, which also works the Roots blower of the foundry. For working the ventilator of the other foundry there is a portable steam-engine.

The clay and sand required for the foundry are prepared in a separate building. This preparation is done by two mortar mills driven by a portable steam-engine.

Drying furnaces.—For drying off the casting cores and clay moulds, there are well built drying furnaces. All that may be objected to in these is that they are not arranged for being fired with inferior cheap fuel.

Fuel of an inferior quality offers a double advantage in this instance—the first, that a cheaper kind of fuel may be used; the second, that it gives a more uniform heat, which is essential for drying-furnaces. When drying-furnaces are heated with good coal, there is a danger of the objects to be dried lying nearest the fuel to become over-heated ("burnt") before the more distant objects have been sufficiently dried; indeed, experience has shewn that *that* fuel is most suitable for drying-furnaces which can just barely maintain itself in a burning state, even with a good draught. Many iron works in Germany and in France have therefore found it profitable to prepare the coke from the coals themselves, as the subsidiary products of coke-making, namely, the escaping gases and the residue in the washing apparatus, can be utilised, the former for heating steam-boilers, and the latter for heating the drying-furnaces.

Socket pipes.—The way and manner in which socket pipes were prepared in the foundry was obsolete and defective; these used to be cast horizontally—a process which rendered the labour difficult and the outturn small and faulty. Socket pipes must be cast *vertically*, if their production is to be profitable. To explain the two systems and the reasons of the superiority of one over the other would be too long and out of place here. I will only add that the arrangement for casting vertically can be easily added to the present one.

Arrangement for tiering pipes.—The arrangement for tiering the pipes is equally unpractical and unsuitable for large operations. This arrangement also may be altered without great expense.

Out-houses.—All those out-houses, such as offices, scale-houses, store and dwelling-houses and others, which were solidly built, are now in good preservation; but those which were built of inferior material are already dilapidated, and impart to this part of the group of buildings a somewhat ruinous appearance.

SUGGESTIONS.

From what has been reported it may be seen that the Bengal Iron Work are worth reopening; and if their management be entrusted to experienced and conscientious professional men, they should turn out a prosperous investment. The situation is well chosen; the raw materials are near and cheap; and the railway is also near for the conveyance of manufactured goods.

The superiority and good condition of all the machinery and the solidity of the chief buildings prove that the undertakers were imbued with the best intentions to render the establishment good, solid, and durable; only it appears that the technical management was entrusted to men of deficient professional experience.

The greatest part of the shortcomings, however, mentioned in the report may be remedied without great costs. Strictly speaking the existing arrangements have to be *completed* rather than altered, and this should be done before the works are started again.

The chief condition of success in an iron work is its *continuous* and *full* function. The production must be driven to a maximum, so that the expenditure on management, interest of capital, &c., which are exceptionally high in India, should be as much as possible distributed over a high production.

MORAR;
26th October 1881.

RITTER C. VON SCHWARZ.

REPORT ON THE FINANCIAL PROSPECTS OF IRON WORKING IN THE CHANDA DISTRICT.

RAW MATERIALS.

Iron ores.

The most important and, at the same time, best situated deposits of iron ores in the Chanda district are the *specular iron ores* at Lohara, longitude 79° 47½′ E., latitude 19° 22′ N., and the *magnetities* at Peepulgaon, longitude 79° 34′ E., latitude 20° 23′ N.

The following is the chemical composition of these iron ores :—

	Lohara ores.	Peepulgaon ores.
Metallic iron	69·00 per cent.	69·06 per cent.
Oxygen in combination	29·57 ,,	26·29 ,,
Mangansesquioxide	0·10 ,,	......
Silica	0·84 ,,	4·21 per cent.
Alumina	0·43 ,,	......
Lime	0·05 ,,	0·50 per cent.
Sulphur	0·01 ,,	......

Each of these deposits forms a continuous accumulation of compact iron ore, constituting a hillock, and is prolonged deep under the general level of the country. The ores are found in such quantities in these places that an iron work producing 80 tons of rails daily might be fed from each deposit for about 100 years without resorting to the deeper-lying ores at greater expense. Besides these two deposits there are other places in the Chanda district where iron ore is found, namely, Lankachen, Ratnapur, Dewalgaon, Ogulpet, Metapur, Gunjwahi, Joonona, Kandeshwa, and others; the ores in these places, however, being either of a poorer quality and containing more impurities, or not being so advantageously situated as those of Lohara and Peepulgaon, deserve, at least for the present, no consideration.

The iron ores of Lohara have in their few impurities all the component parts necessary for the formation of such blast-furnace slag which has the proper chemical composition in regard to the ash contents of the fuel, so that 3 per cent. only of flux will be required for smelting these ores in the blast-furnace by means of charcoal.

As specular iron ores are easier treated in the blast-furnace than magnetites (as is well known to every professional iron-worker), I hold it to be correct on this ground, and on others (explained on page 5), to take up for working, first of all, the iron ores of Lohara (see Appendix No. 1, page 27).

Vegetable fuel.

For the reduction of these iron ores in the blast-furnaces the forests of the Chanda district offer sufficient vegetable fuel, and at prices sufficiently cheap for the production of iron and seel of the best quality, in large quantities, and at competition prices.

The forests of the Chanda district cover an area of 3,325 square miles, of which, however, at present, owing to considerations of carriage, only that part should be exploited as fuel for the reduction of the ores which lies within a circumference of about 20 miles radius round the place which has been chosen as the most suitable for the erection of an iron work.

This part of the forest covers about 520 square miles, capable of yielding 16,000 tons of dry wood per square mile in its present condition.

According to information from the Conservator of Forests, Central Provinces, from this quantity must be deducted about 30 per cent. for reserved trees, which, owing to the valuable quality of their wood, or owing to other reasons, may not be made into charcoal so that about 11,000 tons of wood per square mile may safely be counted upon as available for reducing to charcoal.

The weight of the various woods of the Chanda forests is, on an average 50 ℔ per cubic foot (see Appendix No. 9, page 29); therefore 30 per cent. greater than of the woods (chiefly fir and pine) used in Sweden and Styria for charcoal; the Chanda charcoal being thus specifically heavier is, weight for weight, far more valuable for the smelting of iron ores (see Appendix No. 2, page 27).

According to an estimation of the Conservator of Forests, Central Provinces, the area of 520 square miles of forest, lying round the site of the projected iron works, may yield 32,000 tons of charcoal yearly and be regenerated in forty years.

The same authority maintains that the production of charcoal on a large scale, and carried on systematically, improves forests; this, although apparently paradoxical, has been proved by experience in those parts of Sweden and Styria where vegetable fuel is used on a large scale in the production of iron. The reason for this is not far to seek. The products of the forest being in greater demand and more valuable, the science of forestry has been called in to shew the way to a more correct system of conserving and increasing the contents of forests. The improved and cheaper means of transport, rendered necessary for an Iron Work near a forest, render also cheaper the carriage of building timber and other forest produce, whereby they become cheaper; saw-mills and other wood-working machines may be advantageously connected with an iron work establishment, as this can furnish cheaply the necessary steam-power and supervision.

Coal.

Whilst there is sufficient charcoal in the Chanda forests for the production of *pig-iron*, the coal of the Warda-Godavery Valley is good enough for the refining process, namely the conversion of the pig-iron into *finished iron* or *steel* if the necessary arrangements are made, suitable for this quality of fuel. Judging from borings and outcrops, the sources may be estimated to contain 2,525 millions of tons, of which 1,714 millions are available. The most important seams are those of *Wun*, *Pisgaon*, *Ghugus*, *Bunder*, and *Warora*.

Of all these coal-fields, however, the Warora seam only is now worked, and produces monthly about 7,000 tons of coal, of which 5,000 tons are bought by the Great Indian Peninsula Railway.

Owing to the small demand of coal the working of this mine is limited; if more use were made of it, the working expenses would be proportionally reduced. It is to be regretted that the quality of this coal is not so satisfactory as the quantity.

An analysis of the Warora coal shows—

	Large coal.	Slack coal.
Fixed carbon	45·6 per cent.	35·5 per cent.
Volatile matters (combustible) ...	26 0 ,,	26·4 ,,
,, ,, (not combustible) ...	14·0 ,,	13·0 ,,
Ashes	14·4 ,,	24·0 ,,

The reasons why this coal must be described as of inferior quantity, as regards its fitness for pyrotechnic uses, are—

(1) its insufficient contents of fixed carbon ·
(2) its insufficient contents of hydrogen, not combined with oxygen;
(3) its large contents of ashes.

All attempts to reduce this coal to coke, suitable for the blast furnace process, have failed, owing chiefly to its deficient proportion of fixed carbon and (not with oxygen combined) hydrogen. It is well-known (although not theoretically proved) that it is generally the hydrogen which imparts to the coal the caking quality necessary for its reduction to coke, but numerous trials have shewn that the Warora coal when heated does not cake, but crumbles to pieces, which pieces give indeed coke, but of a quality suitable only for forge fires, or for lime-burning, and not for blast furnaces (see Appendix No. 3, page 27).

The coal of Warora is good enough, however, for producing all the pyrometric effects necessary for puddling and heating furnaces, and to provide the glow furnaces for Bessemer ingots and sheet iron with the necessary heat. This coal is also good enough for the cementation process (production of blister steel) and the temper process (the production of malleable iron); but it is not suitable for the open-hearth process and for the production of crucible steel in the (reverbatory) flaming furnace, as these processes require a very high temperature. Of the other coal fields of the Warda-Godavery basin, the coal of *Pisgaon* (Berar) appears to me the most hopeful, owing to its large contents of fixed carbon. Its analysis is as follows :—

	Large coal.	Slack coal.
Fixed carbon	65·1 per cent.	36·3 per cent.
Volatile matters	19·2 ,,	32·2 ,,
Ashes	15·7 ,,	31·5 ,,

The large coal of Pisgaon contains, therefore, 20 per cent. more fixed carbon than the large coal of Warora; notwithstanding the superiority of this coal, no arrangements have yet been made to work the seam.

Limestone.

For the reason explained on page 1, the reduction of the iron ores of Lohara in the blast furnace will require 3 per cent. only of limestone as a flux. Excellent limestone for this purpose is to be had in the neighbourhood of Warora; its analysis is as follows :—

Carbonate of lime and magnesium	95·0 per cent.
Silica	2·5 ,,
Alumina and oxide of iron	2·5 ,,

Fireproof material.

More important than the supply of limestone is the supply of suitable and cheap fireproof material. English fireproof bricks would cost, delivered in Chanda, Rs. 16 per 100. Now, the requirements of an iron work, producing about 80 tons finished iron or steel per day, would be 300,000 tons per year, giving thus an expenditure of Rs. 48,000 yearly for firebricks alone; but—

(*a*) fire-clay of a good quality is found along with the coal in the Warora Colliery; the following is an analysis of this fire-clay : —

Moisture	4·10 per cent.
Organic matter	4·30 ,,
Silica (sand)	2·40 ,,
Silica (in silicates)	63·20 ,,
Alumina (Al_2O^3)	18·80 ,,
Oxide of iron	0·50 ,,
Iron in pyrite	1·87 ,,
Carbonate of lime	1·80 ,,
Alkalis and sulphur	2·03 ,,
Loss	1·00 ,,

This clay is not so good as first-class English fire-clay, but is good enough for most parts of the iron-melting furnaces.

(*b*) Near Chanda is also found steatite (Mg. O Si O_2), which, mixed with one-fifth part fire-clay, is well known to give very refractory firebricks.

Fire-proof bricks could be made at the Iron Works for Rs. 2-8 per 100, and about four-fifths of the whole requirement could be covered by these bricks; only for certain parts of the blast furnace and the gas furnaces, it would be necessary to import English firebricks, namely, one-fifth of the whole amount.

AMOUNT OF PRODUCTION.

The amount of iron or steel which can be produced yearly with these raw materials will depend on the quantity of charcoal which the forests near the Iron Work can furnish without irretrievable injury to them; this has been estimated at 32,000 tons per year (*vide* page 2), and with this charcoal may be turned out 25,000 tons of finished iron per year. In case it may be found desirable in the future to considerably enlarge the iron work, recourse may be had to the more distant forests situated south and south-east of Chanda (see plan No 1) for charcoal for the production of *pig iron*. In this case it will be advisable to erect other blast furnaces near these forests, with the view of reducing the iron ores of the contiguous deposits and of conveying the pig iron thus obtained to the other Iron Works, situated nearer the sources of *mineral fuel*, for the purpose of converting it into finished iron. By these means the whole 2,325 square miles of forests in the Chanda district might make it possible for 260,000 tons of iron or steel being produced yearly.

BEST SITUATION FOR AN IRON WORK.

For the production of one ton of finished iron or steel the following quantities of the available materials are necessary :—

	Tons.
Iron ores	1·80
Charcoal	1·30
Mineral coal from Warora	3·00
Limestone	0·03

From these proportions it may be seen that the quantity of fuel is more than double that of ore. On this account, and as besides, for well-known reasons, the carriage of ores, even weight for weight, is cheaper than the carriage of fuel, and store of them easier kept, an Iron Work should always be built as near as possible to the sources of the fuel.

It may also be remarked that the carriage of charcoal is dearer than the carriage of mineral coal.

A suitable place for the Iron Work would be Durgapur on the Fraee stream. This place is surrounded by forests, has enough water even in the driest season, has a firm ground for building and heavy machinery, cheap stone and lime; has also the advantage of being situated somewhat high, and is therefore more within the influences of the breezes, which would keep the Iron Work cool.

This place could also be cheaply put into communication with Lohara and Warora by means of a tramway, as there are neither hills to cross nor expensive bridges to make. The suitability of this place, however, is best proved, I think, by the annexed plan, No. I, and attention should also be drawn to the important fact that this place, on the Fraee stream, is the only one between Lohara and Warora on which a sufficient supply of water all the year round may be relied upon.

In further support of the preference of this place on account of its water-supply, it may be mentioned that the want of this convenience has caused to the Bengal Iron Works Company an extra expenditure of nearly Rs. 50,000 (see Report on the Bengal Iron Works, page 1).

RAILWAYS.

Under the present circumstances, the best means of connecting the iron mine of Lohara and the Warora Colliery with the Iron Work would be a portable tramway. This would cost, everything included, about Rs. 12,000 per mile. The whole length of the tramway would be 55 miles (see Plan No. 1); the total expenditure would therefore be Rs. 6,60,000.

The building of an ordinary railway would, for the present, not answer; it would cost about nine times as much as the tramway (the Warda-Warora Coal State Railway was built at an expenditure of Rs. 1,06,000 per mile) and would hardly pay any interest on the capital expended, especially as the extension of such a railway eastwards can hardly be expected to be undertaken for a long time.

Nevertheless, should an ordinary ("pucca") railway become necessary in the future in consequence of an enlargement of the Iron Work, or through other reasons, the tramway being portable, could be transferred elsewhere and advantageously utilised as a way for transport of charcoal and other forest produce.

Besides, the proposed tramway, traversing the best and thickest parts of the Chanda forest, could at once be utilised for transport of forest produce; combining also the best cultivated and best populated stretch of the Chanda district, it would advantageously connect this with the main railway at Warora.

This tramway line has been proposed after consulting and with the approval of the Conservator of Forests for the Central Provinces and the Deputy Commissioner of the Chanda district. This, and the reasons developed on page 1, are further grounds for first taking in hand the iron ore deposits of Lohara. A modification of the tramway project could take place only if the often spoken of railway extension between Chanda and Warora were definitely resolved upon.

CAST-IRON GOODS.

There is no doubt that, with such excellent raw materials as the Chanda district possesses, an excellent quality of cast-iron may be produced; and it follows also that only such cast-iron goods should here be turned out in which a good quality of iron is of importance, and which are, therefore, sold at higher prices.

Heavy castings.

For the production of such heavy castings as plumber blocks, steam-engine fly-wheels, and other heavy parts of machinery, also of weights, railings, columns, lamp-posts, &c., the raw material of the Chanda district is too valuable.

Pottery castings.

It is further unsuitable for the fabrication of cast pottery and objects of art, as all such things have to be run fine, delicate forms have to be filled, and smooth surfaces given to the castings; for all such goods phosphorus in the cast-iron in necessary, which is not found in the ores of the Chanda district.

Cast-iron railway wheels.

An ariticle very much in use, and the manufacture of which would be particularly suitable to our circumstances, would be *cast-iron railway wheels*.

It is a strange fact that for a long time, and almost exclusively, cast-iron wheels have been used on the railways on the American continent, not only with goods and passenger wagons, but also with locomotives, whilst in Europe they are generally used with goods wagons, never with passenger wagons, and by no means with locomotives.

Considering the enormous extension of railways in America,—the mileage being greater than that of England, Germany, Austria, France, and Russia taken together—it might be correctly presumed that the Americans have good experience in this matter.

When the great difference in the price of a cast-iron wheel and a wheel of wrought-iron and steel is considered in conjunction with the enormous quantity used, the subject becomes of some importance.

On the other hand, it may be assumed that the Engineers in Europe, to whom the use of cast-iron wheels is no secret, have also good reasons for abiding by wrought-iron and steel wheels. The fact of cast-iron wheels being, on European railways, limited to goods wagons, would point to a want of confidence in the safety of such wheels against brittleness, whilst the confidence in America in the freedom from brittleness can only be due to the wheels being made of a more reliable quality of cast iron and under a corresponding manipulation.

To enter into the details of manufacturing this article would be out of place here; let it suffice to say that in this matter the greatest care has to be used in the choice of the materials, as well as in the fabrication, if the article is to be free from flaws and reliable in every respect.

Before putting in use, each wheel should be subjected to the most rigid tests for solidity, strength, sufficient hardness in the flanges and general manufacture.

The material used in America for cast-iron wagon wheels is grey pig-iron, obtained from rich and pure red iron ore melted with charcoal, *corresponding therefore exactly with our circumstances.*

The usual duration of such wheels is of that degree that they are allowed to run 60,000 miles in full confidence before they are subjected to new tests as to their further utility.

At the Philadelphia Exhibition four such wheels were shewn which had run 450,000 miles without having suffered in substance or appearance.

Malleable castings.

Another speciality, suitable for the present circumstances, is the production of *malleable castings*. For this article also pig-iron of the best quality (reduced with charcoal) is adapted. To explain it in a few words, the cast articles are embedded in material giving off oxygen, and are slowly heated, whereby the carbon is driven out of the cast-iron to a certain degree, the final product being one of steel-like nature. As a decarbonising means in our case the manganese ores of Malagher and Ramtek (see plan No. 1) can be made use of. The fabrication of malleable iron has lately been brought to great perfection in certain parts of Europe and America. The following articles might be here produced :

ploughshares, scythes, hay-forks, rakes and other agricultural implements; also stirrups, horse-bits, keys, small wheels, certain parts for guns, rifles, and other weapons, double eyes and other parts of machinery, and in general such articles of complicated shapes in which great strength is not required, articles which it would be difficult to make of forage-iron. It is scarcely necessary to mention here that most cast-iron articles may be turned out *direct* from the blast-furnace, without remelting in the cupola furnace.

SUBSIDIARY PRODUCTS.

The subsidiary products of the blast-furnace, as the gases and slag, can and should be utilised,—the former for the heating of the boilers and hot-blast ovens; the latter for the fabrication of cement, artificial stones, and slag wool (*vide* Report on the Bengal Iron Works, page 2).

THE BESSEMER PROCESS.

From the purity and uniformity of the ores and fuel treated of, it may at once be concluded that the product of the blast furnace will also be pure and uniform, and that it will therefore be possible to allow the pig-iron to run in a fluid state *direct* from the blast furnace into the Bessemer converter, whereby the cost of remelting would be saved, as is successfully done in Carinthia, Styria, and Sweden, where the working is carried on under conditions similar to those in our case.

The finishing process of rolling the Bessemer ingots into rails, tyres, plates, &c., requires no particularly high temperature, and can therefore be effected with Warora coal of second quality, *viz. slack coal* at Rs. 2 per ton.

SPIEGELEISEN.

The "spiegeleisen" necessary for the production of steel in the Bessemer converter cannot be obtained from the iron ores of Chanda, as, notwithstanding their purity, their contents of manganese is very slight; "spiegeleisen" would therefore have to be imported.

"Spiegeleisen" contains from 5 to 15 per cent. manganese; it would lead us too far to explain why this ratio of manganese is necessary for the production of "spiegeleisen;" suffice it to saythat hitherto the existence of "spiegeleisen" free of manganese has not been proved (see Appendex No. 4, page 28). For the production of ingot iron) "flusseisen" (a product containing only 0·05 to 0·10 per cent. of carbon) in the Bessemer converter, it is not required to add "spiegeleisen." *Girder plates, boiler plates, rod, angle, and square iron, and rolled beams* of the *stronger* kind, *wagon axles*, and *iron rails* could be turned out cheaply in the Bessemer process, as these descriptions of goods can be made of (ingot iron) "flusseisen," and the cost of "spiegeleisen" is avoided.

The scraps remaining when making rails are generally used up in the open-hearth process, in the cupola furnace, or in the Bessemer converter, where they are melted down with the pig-iron. It has already been shewn (page 3) that under the present circumstances the open-hearth process cannot be used; the other usual resources for utilising the scraps of rails is rationally resorted to only where no better alternative remains. These scraps, however, yield particularly suitable material for the manufacture of wire and thin hoop-iron, a process which has been in vogue for some years with success in Cleveland, and has lately been initiated in other Bessemer Works. A Bessemer establishment, producing daily 72 tons of rails, can in this wise turn out daily 8 tons of wire or of hoop-iron.

THE PUDDLING AND WELDING PROCESS.

It has already been mentioned (page 3) that the Warora coal can be advantageously used in the puddling and heating (welding) process; but it should be mentioned also, with regard to the purity and richness of the iron ores that a modification of this process has come into use in America, consisting in the adding of iron ores for furthering decarbonisation, whereby the time of finishing the puddling process is shortened, the loss of iron, which used to be about 10 per cent. is reduced to 2 per cent., and there is a corresponding saving in coal and labour. The puddling process has lately been much diminished in Europe, owing to the undoubted success of the Thomas Gilchrist dephosphorising method applied to the Bessemer process, as by this method, the cheaper pig-iron containing phosphorus can be worked, which was before possible only in the puddling furnace; but the latter will still maintain itself—

1*st*, where there in an object to manufature *fine* kinds of iron, or rolled iron goods of *complicated* form, as wire, fine hoop-iron, thin sheet-iron, thin angle and U-iron, &c., because the reduction of the 14-inch thick Bessemer blocks of compact material to small dimensions or complicated forms is combined with much and costly manipulation;

2*nd*, for turning out certain qualities of iron and steel, which cannot be produced in the Bessemer converter, for instance blister and Bresciau steel.

THE DIRECT PROCESS.

It will not be out of place here to bring to notice a new process of iron and steel-making directly of ores, namely, the "*Landore Process*," which, if not at present, may, under the condition of the projected iron work, deserve consideration in *future*.

This process consists in melting a certain amount of grey pig-iron of the best quality in an open-hearth furnace, and adding to the thin fluid metal bath so obtained iron ores till the matter has been decarbonised. It is the oxygen in the iron ore which is here the decarbonising factor, the metallic iron being reduced and dissolved in the metal bath.

This adding of iron ore is continued till the whole of the pig-iron has been decarbonised (which is experimentally ascertained), when "spiegeleisen" or "ferromanganese" is added, as in the Bessemer converter, for the production of a given quality of steel.

It is scarcely necessary to prove that for this process iron ores of the best quality are required; in Landore these are imported from Mokta in Algeria; they contain 62 per cent. metallic iron and have no injurious impurities. Now, these ores cost delivered in Landore, about Rs. 13 per ton, whilst the iron ores of Lohara contain 69 per cent. of metallic iron (7 per cent. more), and would cost, delivered at the iron work in Chanda, Rs. 3¼ per ton.

It should be, however, pointed out that the process under explanation requires a very high degree of heat, as the metal bath has to remain perfectly liquid even in a decarbonised state; the metal bath must also be covered with a layer of slags, 3 inches thick, as a protection against the flame hovering over it, which would act injuriously upon the ores floating on the surface of the bath till they are dissolved.

This cover of slags acting as a bad conductor of heat, a temperature of 1900° centigrade, is required to work the Landore process successfully. It may be doubted whether so high a temperature can be obtained with Warora coal (being poor in carbon), even with the assistance of Siemen's regenerators, but it might be obtained with the Pisgaon coal, which has 20 per cent. more carbon than the Warora coal.

Should therefore in due time the Pisgaon seam be opened out, this process would have a chance of giving excellent results with the Lohara ores. This process has been in use in the Landore Works already 12 years with ever-increasing results: by this time there are 24 furnaces at work, producing together about 2,000 tons of steel per week. The steel turned out with this process is well known for its uniformity and durability, and is therefore preferred in the English arsenals to all other brands. It is due chiefly to the difficulty of finding so pure and rich ores, and to their high cost, that this process has not been more generally adopted (see Appendix 5, page 28).

ARTICLES FOR EXPORT.

The natural resources of the Chanda district offer not only the prospects of supplying India with a considerable portion of her iron and steel requirements, but also of producing articles for exportation to England—articles which are not made in England, but are imported in considerable quantities from the Continent of Europe.

Ferromanganese.

Such are *Ferromanganese*, a mixture of metallic iron with 30 to 75 per cent of metallic manganese, and a few per cents. carbon; it is used as an addition in the Bessemer and open-hearth processes, and also in the cast-steel crucible for the production of certain kinds of steel of special hardness for bandages, cutting tools, manganese steel, &c.

The price of this article is very high, and fluctuates according to the quantity of manganese it contains,—from £15 to £25 per ton delivered at Sheffield. The best part of this article England imports from Hörde in Germany, and Terrenoire in France. The raw materials required for the production of ferromanganese are pure charcoal pig-iron (granulated), and manganese ore containing iron.

There are three systems for the manufacture of ferromanganese, namely, in the crucible, the open-hearth, and the shaft furnace. To explain all these methods would lead too far; suffice it to say that for our conditions the production of ferromanganese with the shaft furnace (Système "Terranoire") would be most suitable.

There is in Ramtek (see Plan No. 1) manganese ore of the following chemical composition:—

	Per cent.
Metallic manganese	54·60
,, iron	6·50
Oxygen in combination	26·50
Silica	6·00
Lime	1·20
Combined water a. div. impurities	5·20

This manganese ore, with the pig-iron obtained from the Lohara ores by means of charcoal, would yield a material for the production of ferromanganese of an excellent quality.

Another manganese ore is found in Malaghar (see Plan No. 1), Wún district, containing 26 per cent. metallic manganese; it is of an inferior quality, and, although nearer, it cannot compete with that of Ramtek.

Brescian Steel.

A second export article to England would be the so-called "*Brescian* or *Milan Steel*." This is a kind of puddling steel, made of a pig-iron free from phosphorous and sulphur, and is an article of commerce in great demand and much esteemed.

In former times, Brescian or Milan steel was only made, as its name indicates, in the districts of Milan and Brescia, and was made with charcoal in the old charcoal hearth. The demand for this article, however, in England and on the Continent of Europe was greater than those districts could satisfy, and Corinthia and Styria are now supplying the greatest part of it.

As material for this product serves pure, white and grey charcoal pig-iron, which are converted in the pudding furnace by means of brown coal or turf into raw steel. It is then rolled by means of the welding process into square bars from ½ to ¾ inch thick. The bars are quickly cooled in water, broken, sorted according to the appearance of the breach, and packed in cases for export to England, France, and Germany.

The price of Brescian steel delivered in Sheffield is £18 per ton.

THE LABOUR QUESTION.

The disproportionally heavy cost and disadvantages arising from climate and social circumstances connected with the maintenance of a European staff of workmen point to the advisability of having recourse, as much as possible, to *native labour*; on the other hand, there is in the native a deficiency of practical professional training and a lower degree of physical and moral strength. Professional training can, however, be imparted to the native, and I believe he can be made to learn the work required at a blast furnace and rolling mill, if he be treated at it with gentleness and patience, if he be strictly controlled, if he be not worked too hard, and if his religious and other prejudices be respected; his physical strength will rise with better diet obtained by means of better wages.

The usual 12 hours of daily attendance ruling in Europe would have to be reduced to 8 hours. It would also be advisable to promise rewards to the European workmen for every native trained sufficiently to replace a European.

There are some branches of iron-work which natives will learn very quickly, such as the manufacture of wire, hoop-iron, malleable iron, ferro-manganese, blister steel, and other operations requiring less physical strength, but more quickness of movement or manual cleverness.

WATER-POWER.

No suitable place can be found in the Chanda District where there is natural water-power available for the driving of the machinery of an iron-work.

The only stream in this district which might be made to furnish water-power is the Winganga, called Prenhita after its union with the Wurda stream north of Bemballa (see plan No. V). This stream has numerous cataracts, which, if concentrated by a canal six miles long, would give a fall of 40 feet.

The quantity of water amounts during the dry season to about 100 cubic feet per second which with the 40-feet fall, would give *theoretically* an effect of about 250 horse-power.

Through the application of a Jonval turbine (the most suitable motor for our conditions), this water-power might be made to furnish a *real* effect of 350 *horse-power*; the use of this water-power for the iron-work is, however, not suitable, and this for the following reasons :—

(1) In the rainy season this stream rises often 50 feet, when the machinery worked by it would have to be stopped, a contingency which an iron-work could not endure, as the laying cold and re-heating of the furnaces are connected with very great expense of money and time, and with other inconveniences which it would be too long to explain here.

(2) The locality of the available water-power is too much out of the way, so that the saving of fuel would be more than counterbalanced by the greater cost of carriage of the raw materials and the manufactured goods.

(3) Water-power is in general of less value for an iron-work because the necessary steam-power for the driving of the machinery may be produced, in most cases, with the gases drawn from the furnaces, that is to say, no extra fuel is required for heating the boilers. The gases of a blast furnace (of a production of 30 tons of pig-iron per day supply about 150 horse-power; the gases of a furnace for Bessemer ingots furnish 130 horse-power, a pudding furnace gives 20 horse-power; and a heating furnace for bar-iron 25 horse-power.

The water-power of the Winganga may become of good use for other industries in the future, when the communications of the district will have been developed.

A short stoppage of a paper, cotton, rice, or saw mill is no great loss, as the time of the inundation can be usefully employed for repairing the machinery, taking stock, &c., which operations, by making a virtue of necessity, could be always reserved for the season of the freshets.

For such establishments water-power has also more value, as it can be assumed that each of its horse-hower is equal to one cwt. of coal per 12 hours.

COST OF RAW MATERIALS.

Iron ore.

The cost of quarrying the iron ore at Lohara and carrying it to the tramway may be estimated at annas 14 per ton, the carriage by tramway from Lohara to the Iron Work, 38 miles, at anna 1 per ton per mile; we have therefore—

	RS.	A.	P.
Cost of the ore at the quarry, per ton	0	14	0
Carriage from Lohara to the Iron Work, 38 miles, at 1 anna per ton	2	6	0
Total cost of one ton of ore delivered at works ...	3	4	0

Charcoal.

According to information received from the Conservator of Forests of the Central Provinces, *charcoal* may be had at the place of production for Rs. 3-13-10 per ton; but it may be presumed that with a larger demand the rates of labour and contingencies will rise and increase the present price of charcoal by 30 per cent.; it will therefore be safer to estimate the cost per ton at Rs. 5-0-6 (see Appendix No. 8, page 28). The transport of charcoal will also best be effected by a portable tramway.

Owing to the larger bulk of this article, and the somewhat greater precautions required to be taken in its carriage, it will cost about 50 per cent. more than that of the ore, namely, annas 1½ per ton per mile.

It should be observed that, according to the information furnished by the Conservator of Forests, Central Provinces, the 32,000 tons of charcoal (which will be required annually) will cause a deboisement of 11 square miles of forest yearly; with regard to the situation of the forest to the Iron Works it will therefore be necessary to shift the charcoal tramway once every 3½ years. Assuming the charcoal tramway to be 20 miles, the cost of its shifting every 3½ years will be 20 × 3,000 = Rs. 60,000 (Rs. 3,000 per mile), which must be distributed over the cost of carriage of the charcoal. Now, tons 32,000 × 3½ (years) = 112,000 tons; therefore the cost of shifting of tramway per ton of charcoal will be $\frac{\text{Rs. } 60,000}{\text{tons } 112,000}$ = annas 9.

The average distance over which the charcoal will have to be carried is 15 miles. The cost of carriage of the charcoal will therefore stand per ton—

	Rs.	A.	P.
Net carriage	1	6	6
Proportion of shifting of tramway every 3½ years ...	0	9	0
Total ...	1	15	6

The total cost of one ton of charcoal delivered at the Iron Works will therefore be—

	Rs.	A.	P.
At the place of production	5	0	6
Total cost of carriage (annas 2¼ per ton per mile) ...	1	15	6
Total ...	7	0	0

It will be observed that in this calculation only the actual expenses have been taken into account, and not the value of the trees to the Forest Department; but it should be remembered that, in an indirect way (explained on page 2), the Forest Department will be sufficiently compensated by an iron work situated near its forests.

Coal.

The prices of coal in Warora are Rs. 5 per ton large coal and Rs. 2 per ton slack coal; its carriage to the Iron Work per tramway would be ¾ annas per ton per mile.

The carriage of the coal is taken 30 per cent. lower than that of the ore, as it will chiefly be done by return train; all other goods will be carried to Warora from the iron works, and the coal to the iron works from Warora. These other goods will be those made in the iron work, but also forest produce and the agricultural produce of the well-cultivated part of the country situated on the Winganga stream, which agricultural produce is sure to be increased through the tramway connecting this district with the main railway at Warora. The total cost per ton of coal delivered at the iron work will therefore be—

	Rs.	A.	P.
Large coal, cost at Warora	5	0	0
Carriage from Warora, 17 miles, at 9 *pies per ton* ...	0	13	0
Total ...	5	13	0
Slack coal, per ton at Warora	2	0	0
Carriage from Warora to the iron works, 17 miles, at 9 *pies*	0	13	0
Total ...	2	13	0

Limestone.

Rs. 2-13-0 per ton.

The cost of limestone delivered at the iron works will be the same as that of slack coal, namely,

WAGES.

Skilled labour.

In the beginning at least skilled labour will have to be done by Europeans (*see* page 10); for certain subordinate operations only suitable natives may be found, as for instance foundrymen, engine-drivers, masons, carpenters, and other auxiliary workmen.

The cost of professional work done by Europeans must be assumed as double that in Europe.

Native labour.

A strong native coolie costs at present in the Chanda district *annas* 2½ per day, but wages must be expected to rise to *annas* 4. If the native labourer be assumed to do, in a given time, only half the work a European would do, he would still cost less than half. Unskilled work, such as loading and unloading the work at the cranes, carriage, masonry, carpentry, locksmith's work, and all auxiliary work can be done by natives, and may be estimated at half the cost for which it is done in Europe.

MANAGEMENT, WEAR AND TEAR, &c.

The cost of these is estimated at 35 per cent. higher than in Europe. This agrees with the experience gained in other large establishments of the kind in India. There will, however, be an economy in respect of fireproof materials, which forms the greatest item in the question of wear and tear, as the raw material is found near the iron work and can be worked up exclusively by coolies.

APPROXIMATE COST OF PRODUCTION.

(1) *Cost of one ton of grey pig-iron*—

		Rs.	Rs.
1·60 tons iron ores	at	3·25	5·20
1·00 ,, charcoal			7·00
Wages			3·66
Limestone, 0·05 tons	,,	2·80	0·14
Management, wear and tear, &c. ...			7·00
Total ...			23·00

(2) *Cost of one ton of white pig-iron*—

1·60 tons iron ores	at	3·25	5·20
0·86 ,, charcoal	,,	7·00	6·02
0·05 ,, limestone	,,	2·80	0·14
Wages			3·34
Management, wear and tear, &c.			6·30
Total ...			21·00

(3) *Cost of one ton of rails* (*Bessemer steel*)—

1·19 tons grey pig-iron	at	23·00	27·37
0·06 ,, spiegeleisen	,,	130·00	7·80
1·00 ,, slack coal from Warora	,,	2·80	2·80
0·50 ,, large coal	,,	5·80	2·90
Wages			10·88
Management, wear and tear, &c.			12·35
Total ...			64·00

(4) *Cost of one ton of rails* (*Bessemer iron*)—

1·25 tons grey pig-iron	at	23·00	28·75
1·00 ,, slack coal	,,	2·80	2·80
0·50 ,, large coal	,,	5·80	2·90
Wages			10·45
Management, wear and tear, &c.			12·10
Total ...			57·00

(5) *Cost of one ton bearing or girder plates of Bessemer iron—*

		Rs.	Re.
1·50 tons grey pig-iron	at	23·00	34·50
1·50 ,, slack coal	,,	2·80	4·20
0·50 ,, large coal	,,	5·80	2·90
Wages			12·40
Management, wear and tear, &c.			14·00
Total			68·00

(6) *Cost of one ton bar-iron, puddled—*

1·15 tons white pig-iron	at	21·00	24·15
0·30 ,, iron ores	,,	3·25	0·97
1·50 ,, slack coal	,,	2·80	4·20
1·50 ,, large coal	,,	5·80	8·70
Wages			11·68
Management, wear and tear, &c.			12·35
Total			62·00

(7) *Cost of one ton rolled wire and thin hoop-iron, puddled—*

1·00 tons white pig-iron	at	21·00	21·00
0·30 ,, grey pig-iron	,,	23·00	6·90
1·80 ,, slack coal	,,	2·80	5·04
1·50 ,, large coal	,,	5·80	8·70
Wages			13·36
Management, wear and tear, &c.			14·00
Total			69·00

(8) *Cost of one ton low moor plates, puddled—*

1·00 tons white pig-iron	at	21·00	21·00
0·40 ,, grey pig-iron	,,	23·00	9·20
1·50 ,, slack coal	,,	2·80	4·20
3·00 ,, large coal	,,	5·80	77·40
Wages			20·20
Management, wear and tear, &c.			22·00
Total			94·00

(9) *Cost of one ton sheet-iron, puddled—*

1·20 tons white pig-iron	at	21·00	25·20
0·30 ,, iron ores	,,	3·25	0·97
2·50 ,, slack coal	,,	2·80	7·00
1·50 ,, large coal	,,	5·80	8·70
Wages			15·13
Management, wear and tear, &c.			14·00
Total			71·00

(10) *Cost of one ton blister steel—*

0·98 tons bar-iron	at	62·00	60·76
0·20 ,, charcoal	,,	7·00	1·40
4·00 ,, slack coal	,,	2·80	11·20
Wages			10·64
Management, wear and tear, &c.			14·0
Total			98·00

(11) *Cost of one ton Brescian steel—*

0·60 tons grey pig-iron	at	23·00	13·80
0·70 ,, white pig-iron	,,	21·00	14·70
2·00 ,, slack coal	,,	2·80	5·60
1·50 ,, large coal	,,	5·80	8·70
Wages			13·20
Management, wear and tear, &c.			14·00
Total			70·00

(12) *Cost of one ton ferromanganese with 60 per cent. manganese—*

		Rs.	Rs.
0·50 tons grey pig-iron (granulated) ...	at	23·00	11·50
1·50 „ manganese ore from Remtek (including transports	„	7·00	10·50
5·00 „ charcoal	„	7·00	35·00
Wages			16·00
Management, wear and tear, &c.			17·00
		Total ...	90·00

Recapitulation.

		Rs.
Cost of one ton	grey pig-iron at the ironwork	23·00
Ditto	white ditto ditto	21·00
Ditto	Bessemer steel rails ditto	64·00
Ditto	ditto iron rails ditto	57·00
Ditto	bearing or girder plates of Bessemer iron ...	68·00
Ditto	puddled bar-iron	62·00
Ditto	rolled wire or thin hoop-iron	69·00
Ditto	"low moor" plates	94·00
Ditto	thin sheet-iron	71·00
Ditto	blister steel	98·00
Ditto	Brescian steel	70·00
Ditto	ferromanganese with 60 per cent. manganese...	90·00

REMARKS.—In the calculations of the costs of production the *actual* expenses are only taken into account, *excluding* interest of capital invested in the ironwork, as well as Government fees and taxes of any description.

2. The prices are given in rupees, per ton, at the works.

COMPARATIVE STATEMENT

Showing the difference of prices of iron and steel goods in different Railway Stations.

NAMES OF STATIONS.	BESSEMER STEEL RAILS.				BESSEMER IRON RAILS.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	English prices.	Our cost prices.	Difference in our favour.	REMARKS.
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Agra	124·0	111·0	13·0	*Viá* Ajmere.	109·0	104·0	5·0	
Allahabad	126·0	106·2	19·8	*Viá* Bhosawul.	111·0	99·2	11·8	
Benares	134·0	114·2	19·8	Ditto.	119·0	107·2	11·8	
Bhosawul	98·8	79·0	19·8	Ditto.	83·8	72·0	11·8	
Bombay	82·0	95·8	......	Ditto.	67·0	88·8	......	
Cawnpore	130·0	110·2	19·8	Ditto.	115·0	103·2	11·8	
Gwalior	133·0	120·0	13·0	*Viá* Ajmere.	118·0	113·0	5·0	
Jubbulpore	115·0	95·2	19·8	*Viá* Bhosawul.	100·0	88·2	11·8	
Lahore	143·5	130·5	13·0	*Viá* Ajmere.	128·5	123·5	5·0	
Lucknow	134·0	114·2	19·8	*Viá* Bhosawul.	119·0	107·2	11·8	
Mooltan	153·0	140·0	13·0	*Via* Ajmere.	138·0	133·0	5·0	
Nagpore	111·5	71·3	40·2	*Via* Bhosawul.	96·5	64·3	32·2	
Neemuch	115·5	95·7	19·8	Ditto.	100·5	88·7	11·8	
Warora	112·5	65·3	47·2	Ditto.	97·5	58·3	39·2	

NAMES OF STATIONS.	GIRDER PLATES AND SHIP PLATES.				PUDDLED BAR-IRON.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	Swedish prices.	Our cost prices.	Difference in our favour.	REMARKS.
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Agra	161·0	115·0	46·0		202·0	109·0	93·0	
Allahabad	163·0	110·2	52·8		204·0	104·2	99·8	
Benares	171·0	118·2	52·8		212·0	119·0	93·0	
Bhosawul	135·8	83·0	52·8		176·8	77·0	99·8	
Bombay	119·0	99·8	19·2		160·0	93·8	66·2	
Cawnpore	167·0	114·2	52·8		208·0	108·2	99·8	
Gwalior	170·0	124·0	4·60		211·0	118·0	93·0	
Jubbulpore	152·0	99·2	52·8		193·0	93·2	99·8	
Lahore	180·5	134·5	46·0		221·5	128·5	93·0	
Lucknow	171·0	118·2	52·8		212·0	112·2	99·8	
Mooltan	190·0	144·0	46·0		231·0	138·0	93·0	
Nagpore	148·5	75·3	73·2		189·5	69·3	120·2	
Neemuch	152·5	99·7	52·8		193·5	93·7	99·8	
Warora	149·5	69·3	80·2		190·5	63·3	127·2	

REMARKS.—The prices are given per ton, including freight; the latter is calculated at the rates for first class railway goods. The English prices are given according to the market rates for March 1882, and are, of course, subject to the influence of the fluctuations of the prices in the European markets.

COMPARATIVE STATEMENT

Showing the difference of prices of iron and steel goods in different Railway Stations—concld.

NAMES OF STATIONS.	THIN HOOP-IRON AND ROLLED WIRE.				"LOW MOOR" PLATES.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	English prices.	Our cost prices.	Difference in our favour.	REMARKS.
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Agra	182·0	116·0	66·0		442·0	141·0	301·0	
Allahabad	184·0	111·2	72·8		444·0	136·2	307·8	
Benares	192·0	119·2	72·8		452·0	144·2	307·8	
Bhosawul	156·8	84·0	72·8		416·8	109·0	307·8	
Bombay	140·0	100·8	39·2		400·0	125·8	274·2	
Cawnpore	188·0	116·2	72·8		448·0	140·2	307·8	
Gwalior	191·0	125·0	66·0		451·0	150·0	301·0	
Jubbulpore	166·0	93·2	72·8		433·0	125·2	307·8	
Lahore	201·5	135·5	66·0		461·5	160·5	301·0	
Lucknow	192·0	119·2	72·8		452·0	144·2	307·8	
Mooltan	211·0	145·0	66·0		471·0	170·0	301·0	
Nagpore	169·5	76·3	93·2		429·5	101·3	328·2	
Neemuch	173·5	100·7	72·8		433·5	125·7	307·8	
Warora	170·5	70·3	100·2		430·5	95·3	335·2	

NAMES OF STATIONS.	THIN SHEET-IRON.				BLISTER STEEL.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	English prices.	Our cost prices.	Difference in our favour.	REMARKS.
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Agra	182·0	118·0	64·0		342·0	145·0	197·0	
Allahabad	184·0	113·2	70·8		344·0	140·2	203·8	
Benares	192·0	121·2	70·8		352·0	148·2	203·8	
Bhosawul	156·8	86·0	70·8		316·8	113·0	203·8	
Bombay	140·0	102·8	37·2		300·0	129·8	170·2	
Cawnpore	188·0	118·2	70·8		348·0	144·2	203·8	
Gwalior	191·0	127·0	64·0		351·0	154·0	197·0	
Jubbulpore	166·0	95·2	70·8		333·0	129·2	203·8	
Lahore	201·5	137·5	64·0		361·5	164·5	197·0	
Lucknow	192·0	121·2	70·8		352·0	148·2	203·8	
Mooltan	211·0	147·0	64·0		371·0	174·0	197·0	
Nagpore	169·5	78·3	91·2		329·5	105·3	224·2	
Neemuch	173·5	102·7	70·8		333·5	129·7	203·8	
Warora	170·5	72·3	98·2		330·5	99·3	231·2	

NAMES OF STATIONS.	CAST-IRON PIPES.				CAST-IRON SLEEPERS.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	English prices.	Our cost prices.	Difference in our favour.	REMARKS.
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Agra	117·0	92·0	25·0		98·0	87·0	11·0	
Allahabad	119·0	87·2	31·8		100·0	82·2	17·8	
Benares	127·0	95·2	31·8		108·0	90·3	17·8	
Bhosawul	91·8	60·0	31·8		72·8	55·0	17·8	
Bombay	75·0	76·8	......		56·0	71·8	......	
Cawnpore	123·0	91·2	31·8		104·0	86·2	17·8	
Gwalior	126·0	101·0	25·0		107·0	96·0	11·0	
Jubbulpore	108·0	76·2	31·8		89·0	71·2	17·8	
Lahore	136·5	111·5	25·0		117·5	106·5	11·0	
Lucknow	127·0	95·2	31·8		108·0	90·2	17·8	
Mooltan	146·0	121·0	25·0		127·0	116·0	11·0	
Nagpore	104·5	52·3	52·2		85·5	49·3	36·2	
Neemuch	108·5	76·7	31·8		80·5	71·7	17·8	
Warora	105·5	46·3	59·2		86·5	41·3	45·2	

NAME OF STATION.	"BRESCIAN" STEEL.				FEROMANGANESE, WITH 60 PER CENT. MANGANESE.			
	English prices.	Our cost prices.	Difference in our favour.	REMARKS.	English prices.	Our cost prices.	Difference in our favour.	REMARKS.
	£	£	£		£	£	£	
Sheffield	18·0	10·0	8·0		22·0	11·50	10·50	

REMARKS.—The prices are given per ton, including freight; the latter is calculated at the rates for first class railway goods.

The English prices are given according to the market rates for March 1882, and are, of course, subject to the influence of the fluctuations of the prices in the European markets.

APPROXIMATE ESTIMATE OF AN IRON WORK

PRODUCING 80 TONS BESSEMER STEEL RAILS PER DIEM.

See plans Nos. II and III.

	Rs.	Rs.	Rs.
I.—FURNACES AND MACHINERY—			
(*a*)—*For the Blast Furnaces*—			
3 Ore crushers		7,200	
2 Blowing engines, each giving 2,000 cubic feet air per minute, with 2 water pumps—			
Machinery	54,000		
Foundations	10,000		
		64,000	
1 Hoist for iron ores, charcoal and limestone		18,000	
12 Steam-boilers, each 40 horse-power—			
Boilers	36,000		
Masonry	12,000		
		48,000	
3 Blast furnaces, each producing 33 tons of pig-iron per day—			
Cast and wrought iron	69,000		
Masonry	18,000		
		87,000	
6 Hot-blast ovens—			
Cast and wrought iron	18,000		
Masonry	6,000		
		24,000	
Regulator of blast, gas conduit, blastman, steam and water pipes, &c.—			
Cast and wrought-iron	24,000		
Masonry	6,000		
		30,000	
2 Water reservoirs, each for 15,000 cubic feet contents ...		15,000	
Cinder and ore tubs, scales, stools, &c.		15,000	
			3,08,200
(*b*)—*For the Bessemer and Rolling Mill*—			
4 Gas furnaces—			
Cast and wrought-iron	20,000		
Masonry	8,000		
		28,000	
Bessemer converters, each for 5 tons contents—			
Cast and wrought-iron	15,000		
Masonry	2,000		
		17,000	
2 Cupola furnaces, including derrick—			
Cast and wrought-iron	5,000		
Masonry	1,500		
		6,500	
3 Drying furnaces with crane—			
Cast and wrought-iron	2,500		
Masonry	2,000		
		4,500	
1 Blowing engine—			
Machinery	36,000		
Foundation	6,000		
		42,000	
1 Water-pump with accumulator for the hydraulic machinery—			
Machinery	10,000		
Masonry	3,000		
		13,000	
1 Hydraulic crane for 10 tons maximum weight—			
Machinery	7,500		
Masonry	2,000		
		9,500	

	Rs.	Rs.	Rs.
3 Hydraulic cranes for 4 tons maximum weight—			
Machinery	5,000		
Masonry	1,500		
		6,500	
1 Blooming mill with 250 horse-power steam-engine and 45 tons fly wheel—			
Machinery	70,000		
Foundation	8,000		
		78,000	
1 Rails mill with 300 horse-power steam-engine and 40 tons fly wheel—			
Machinery	90,000		
Foundation	11,000		
		1,01,000	
1 Steam-hammer, including crane—			
Machinery	15,000		
Foundation	5,000		
		20,000	
16 Steam-boilers, each 40 horse-power—			
Boilers	48,000		
Masonry	16,000		
		64,000	
2 Water reservoirs, each for 15 cubic feet		15,000	
2 Water-pumps, including steam-engine		6,000	
2 Feeding pumps for the steam-boilers, including steam-engine		3,200	
1 Large scale for weighing the Bessemer blocks—			
Machinery	2,500		
Masonry	1,500		
		4,000	
2 Circular saws with steam-engine		3,000	
3 Drilling machines		4,500	
1 Punching machine		2,500	
1 Slotting ,, ...		1,500	
2 Straightening machines		5,000	
1 35 horse-power steam-engine, including transmission—			
Machinery	4,000		
Foundation	600		
		4,600	
Cooling beds for rails		3,000	
Steam, water, and air pipes		14,000	
Pans, railways, wagons, ingot-moulds, tools, &c.		10,000	
			4,66,300
(c)—*For the workshops*—			
1 Large lathe for the cylinders		5,000	
1 Small ,, ,, ...		1,500	
1 Planing machine		3,000	
1 Drilling ,, ...		1,200	
2 Root's blowers		2,400	
1 Steam-engine of 40 horse-power, including transmission—			
Machinery	4,500		
Foundation	700		
		5,200	
2 Steam-boilers each 20 horse-power—			
Boilers	3,600		
Masonry	1,200		
		4,800	
1 Crane		5,000	
1 Cupola furnace with derrick—			
Cast and wrought iron	2,000		
Masonry	600		
		2,600	
Tools, pipes, railways, &c.		4,000	
			34,700

	Rs.	Rs.	Rs.
II.—BUILDINGS—			
(a)—For the Blast Furnaces—	Area in square feet.		
3 Charcoal shops	30,000	30,000	
Store-yards for iron ores, coal, and limestone ...	40,000	7,500	
Ore-crush and ore-mixing house	3,000	6,000	
2 Blowing engine-houses	5,000	15,000	
Building for the hoist	800	8,000	
Foundry hall	15,000	22,500	
2 Chimneys, each 120 feet high	500	8,000	
Channels and drains		6,000	
			1,03,000
(b)—For the Bessemer Mill—			
Bessemer and rolling mill	100,000	2,50,000	
2 Chimneys, each 120 feet high	500	8,000	
Channels and drains		6,000	
			2,64,000
(c)—For the Workshops and divers other buildings—			
2 Workshops	20,000	40,000	
Store-room	4,000	8,000	
Scale and porter-house, including scale	1,500	5,000	
Office	7,000	14,000	
3 Dwelling-houses for Engineers	12,000	18,000	
3 Barracks for workmen	18,000	24,000	
1 Chimney for workshops, 80 feet high ...	150	1,000	
Drains and channels		1,000	
			1,11,000
III.—EARTHWORK—			
Levelling ditches, tanks, dams, &c.			20,000
IV.—TRAMWAYS—			
55 *running miles* tramway to connect Lohara and Warora with the Iron Work. 20 *running miles* for transport of charcoal to the Iron Work, altogether 75 miles tramway, per mile	12,000	...	9,00,000
V.—WORKING CAPITAL—			
Amount invested in stores		1,50,000	
Reverse funds		1,50,000	
			3,00,000
VI.—ENGAGEMENT AND BRINGING OUT OF 70 EUROPEAN WORKMEN		...	35,000

Recapitulation

	Rs.	
Cost of furnaces and machinery	8,09,200	
Do. buildings and earthwork...	4,98,000	
Do. tramways (75 miles)	9,00,000	
Do. bringing out European workmen	35,000	
Working Capital and Reserve funds	3,00,000	
Total ...	25,42,000	25,42,000

An Iron Work producing 80 *tons Bessemer steel rails per day costs* **Rs. 25,42,000.**
(See Appendix No. 7, page 28.)

APPROXIMATE ESTIMATE OF AN IRON WORK

PRODUCING 80 TONS OF PUDDLED BAR-IRON, HOOP-IRON, THIN SHEET-IRON, AND ROLLED WIRE PER DAY.

(See Plan No. IV.)

	Rs.	Rs.	Rs.
I.—FURNACES AND MACHINERY—			
(a)—For the Blast Furnaces—			
The same as for the Bessemer work, see page 19		...	3,08,200

(*b*)—*For the Puddling and Rolling Mill*—	Rs.	Rs.	
38 Puddling furnaces—			
Cast and wrought iron	53,200		
Masonry	22,800		
		76,000	
10 Heating furnaces—			
Cast and wrought iron	20,000		
Masonry	10,000		
		30,000	
2 Re-heating furnaces—			
Cast and wrought iron	1,000		
Masonry	500		
		1,500	
24 Steam-boilers—			
Boilers	72,000		
Masonry	24,000		
		96,000	
6 Steam-hammers—			
Machinery	54,000		
Foundation	18,000		
		72,000	
3 Puddling trains—			
Machinery	72,000		
Foundation	9,000		
		81,000	
1 Bar-iron train—			
Machinery	30,000		
Foundation	3,000		
		33,000	
1 Sheet-iron train—			
Machinery	40,000		
Foundation	5,000		
		45,000	
1 Hoop-iron train—			
Machinery	30,000		
Foundation	3,000		
		33,000	
1 Wire iron—			
Machinery	36,000		
Foundation	4,000		
		40,000	
2 Double shears for puddle-bar	...	6,000	
1 „ shear for bar-iron	...	2,500	
1 „ „ sheet-iron	...	3,000	
1 Circular „ „	...	1,500	
3 Water reservoirs, each for 10,000 cubic feet	...	16,000	
3 „ pumps with steam-engines	...	6,000	
3 Feeding pumps for boilers	...	4,800	
Steam and water pipes, &c.	...	14,000	
Tools, railways, wagons, &c.	...	10,000	
			5,71,300
(*c*)—*For the Workshops*—			
2 Large lathes for cylinders	...	8,000	
2 Smaller „ „	...	5,000	
The other machinery is the same as for the Bessemer work		29,700	
			42,700
II—BUILDINGS—			
(*a*)—*Blast Furnaces*—			
The same as for the Bessemer work	...	...	1,03,000
	Area in square feet.		
(*b*)—*For the Puddling and Rolling Mill*—			
Puddling mill	82,000	1,64,000	
Rolling mill	42,000	84,000	
9 Chimneys, each 100 feet high	2,000	22,500	
Channels and drains	......	6,000	
			2,76,500

	Rs.	Rs.
(*c*)—***Workshops and divers buildings***—		
The same as for the Bessemer work		1,11,000
III.—EARTHWORK—		
Levelling ditches, tanks, drains, &c.		20,000
IV.—TRAMWAYS—		
75 running miles (as before), per mile Rs. 12,000		9,00,000
V.—ENGAGEMENT OF 70 EUROPEAN WORKMEN		35,000
VI.—WORKING CAPITAL—		
Amount invested in stores		1,50,000
Reserve Funds		1,50,000
Recapitulation.		
Furnaces and machinery	9,22,200	
Buildings and earthwork	5,10,500	
Tramways	9,00,000	
Working Capital and Reserve Funds	3,00,000	
Engagement of European workmen	35,000	
Total ...	26,67,700	26,67,700

An Iron Work producing 80 tons per day of puddled bar-iron, thin sheet-iron, hoop-iron and rolled wire costs Rs. 26,67,700.

(See Appendix No. 7, page 28.)

APPENDICES.

No. 1.—The proportion of the pig-iron to the slags in the blast furnace should not exceed that of 5 : 1. The reason of this is that the pig-iron, which accumulates in the lowest part of the blast furnace requires to be protected from the decarbonising effect of the blast streaming out of the tuyeres. This protection is offered by a sufficiently thick layer of slags, which, being specifically lighter, floats on the surface of the pig-iron bath like oil on water, keeping off every injurious action of the air hovering over it. As a rule, the quantity of slags is twice and three times as large as that of the pig-iron. In the smelting of the Lohara ores, the decidedly rare case presents itself of the ores being too pure and the blast surface slags consisting of the impurities of the ores, the ashes of the fuel and of the flux, representing 16 per cent. only of the quantity of pig-iron. To complete, therefore, the deficiency of 4 per cent., the ores of Lohara require an addition of 12 per cent. of an inferior ore, which is to be found in the neighbourhood of the projected Iron Work.

The reason of the difficulty in treating magnet iron ores lies in general in their low melting point, combined (notwithstanding their proportionately smaller contents of oxygen) with a difficulty in reduction. On this account it easily occurs that magnetites begin to melt in the blast surface before the oxygen has been driven out, bringing about the unpleasant consequences well known to iron-masters. Magnetites can therefore not be worked with a blast of high temperature in order to reduce them, as much as possible, with carbonic oxygen gas (CO), that is to say, at a lower temperature.

Therefore, also, for the smelting of magnetite ($Fe_3 O_4$) proportionately larger consumption of fuel in the blast furnace is required than in the smelting of specular iron ores ($Fe_2 O_3$), a kind of red iron ore, although the latter requires more carbon for its reduction than the former.

No. 2.—The reasons why specifically heavier charcoal, weight for weight, is more valuable than specifically lighter charcoal are the following :—

(1) A larger quantity of fixed carbon is comprised in a smaller space, whereby, as is well known, the pyrometric effect of every decription of fuel is raised.

(2) The larger the specific weight is of charcoal, the greater is its resistance to being crushed, and this consideration is very important in regard to the use of charcoal in the blast furnace. In general, the dimensions of a blast furnace should be *as large as possible*, as thereby fuel, labour, and wear and tear are spared, but their limit is determined by the height of the furnace from which all the other dimensions depend. The height of a blast furnace again depends on the mechanical resistance "capacity" of the fuel to be used, which

"capacity" should be great enough to enable it to bear, in the lower parts of the furnace, the whole weight of the smelting column which fills the furnace (namely, the ore, fuel, and flux) without being crushed. Coke furnaces are worked most economically, because their height reaches 70 feet, and their outturn of pig-iron can be raised to 75 tons per day. The charcoal blast furnaces of Styria and Sweden have a maximum height of 45 feet, and produce 20 tons of pig-iron, but the charcoal of Chanda will allow of a blast furnace 52 feet high capable of turning out daily from 30 to 35 tons of pig-iron.

No. 3.—Coke for the blast furnace process should not be smaller than half a fist; it is better when the pieces are more than the size of a fist, and this on the following grounds:—

(1) To facilitate their onward motion, together with the ore and flux, which is necessary for the promotion of the chemical reactions between the fuel, ore, and flux as they sink in the blast furnace, which chemical reactions are possible only when the materials remain in constant touch with one another.
(2) To render possible the withdrawing of the gases rising from the lower parts of the blast furnace, which evidently would not take place if all the interstices between the materials which fill the blast furnace were choked up with small particles of coke.

No. 4.—It may not be out of place here to meet an objection arising from an opinion still often entertained, that for the purpose of producing "spiegeleisen," manganese ores may be added to iron ores devoid of it by introducing it into the blast furnace in proper quantities along with the iron ore.

The question may be raised in our case, as manganese ore is found not far from the iron work (see plan No. I, page 10). All such attempts have failed in practice, owing to the difficulty of reducing manganese ore. It is found that the iron ore is reduced (the oxygen driven out) and carbonised; therefore ready for the melting process, when the manganese ore, which had been put in simultaneously with the other, has scarcely commenced giving off its oxygen; in other words, has scarcely commenced to be reduced.

The natural consequence then results that the manganese ore (reaching the melting zone almost unchanged) is fused in this condition, and forms a good part of the blast-furnace slags without amalgamating itself with the pig-iron.

The simultaneous reduction of oxide of mangenese and oxide of iron can only take place when the particles of both are most intimately mixed, which is the case in iron ores containing a large percentage of oxide of manganese.

An alloy of metallic iron and manganese, the so-called ferromanganese, can be obtained by certain manipulations (see page 9); but as ferromanganese cannot replace "spiegeleisen," this process is not worth further consideration in *this* place.

No. 5.—The direct process of Siemen's is, under the conditions before us, not suitable, because this process depends also upon the open-hearth furnace, as the iron blooms (the end product of the Siemen's rotator furnace) have to be dissolved in the pig-iron bath of the open-hearth for the conversion into steel. These blooms are therefore used in the same manner as the iron ores in the Landore process.

Should, however, in future the open-hearth process become practicable (through opening of the Pisgaon coal mine—see page 3), it is then the *Landore* direct process would be preferable, as, in our case, the iron ores of Lohara would cheaply replace the iron blooms of Siemen's rotator.

No. 6.—For the reasons explained in page 27, an addition of 12 per cent. of poorer ores will be necessary for the Lohara ores. Such poorer ores are to be found in Joonona, about 19 miles from the iron work, therefore about 20 miles nearer than those of Lohara; but as the former have to be carried by cart to the iron work, the price of Rs. 3¼ (delivered at the works) remains unaltered.

No. 7.—The estimate includes the cost of the tramway for the transport of the charcoal to the iron work. The length of this tramway would be 20 miles, and its price Rs. 2,40,000. In the first seven years, however, the charcoal might be carried on the other tramway, *viz.* that connecting the iron work with Lohara and Warora, and the building of the charcoal tramway might be deferred till the necessary rails, sleepers, *&c.*, can be made in our own iron work.

No. 8.—Cost per ton of manufactured charcoal from the Mahorli forest, at the place of production, for iron work. (The dates are furnished by the Conservator of Forests, Central Provinces.)

When the yield per square mile is tons charcoal.	Felling and collection of wood, and manufacture of charcoal.	Cultural operations for maintenance of yield.	Establishment.	Wear and tear of building and stock.	Total.	Allowing for rise in wages and contingencies to be expected 30 per cent.	REMARKS.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
2,000	3 9 0	1 12 0	0 10 0	0 3 0	6 2 0	8 0 0	
3,000	2 12 8	1 2 0	0 10 0	0 3 0	4 11 8	6 2 0	
4,000	2 1 0	0 12 0	0 10 0	0 3 0	3 10 0	4 11 4	
6,000	1 7 2	0 8 0	0 10 0	0 3 0	2 12 2	3 10 0	
10,000	0 15 4	0 5 0	0 10 0	0 3 0	2 1 4	2 12 0	
Average ...	2 2 8	0 14 2	0 10 0	0 3 0	3 13 10	5 2 6	

No. 9.—Memorandum shewing the principal species of trees occurring in the Chanda forests which are permitted to be felled for consumption.

Botanical names.	Hindustani names.	Weight per c. ft. in lb.	REMARKS.
Acacia Leucophloa	Reunja	55	*
Do. Catechu	Khair	75	*
Adina Cordifolia	Haldu	42	
Albizzia Lebbek	Sirrus	52	
Do. Lucida	Do.	40	
Do. Odorotissima	Basseni Sirus ...	40	*
Do. Procera	Safed Sirrus .	42	*
Bauhinia Retusa	Bhoti	54	
Do. Variegata	Kachuar	54	
Do. Malabarica	Amlosa	42	
Barringtonia Acutangula	Salamandar Phal ...	56	
Bombax Malabaricum	Semal	29	
Boswellia Thurifera	Satai	33	
Butea Frondosa	Palus	34	
Cassia Fistula	Amaltas	59	
Cochlospernum Gossypium	Gadbi	30	
Conocarpus Latifolia	Dhawra	61	
Diospyrus Melanoxylon	Pendu	75	
Gardenia Turgida	Ghuga	56	
Feronia Elephantum	Kawity	50	
Gardenia Gummifera	Dekarmali ...	54	
Do. Lucida	Do.	54	
Do. Latifolia	Papra	52	
Grewia Oppositifolia	Bihul	40	
Do. Vestita	Dhamin	50	
Helicteris Isora	Maror Phal ...	40	
Ixora Parviflora	Lokhandi	45	
Kydia Calycina	Baranja	42	
Lebidicropsis Orbicularis	Jarari	45	
Legerstrœmia Parviflora	Leudia	45	*
Limonia Acidissima	Bali	60	
Nauclea Parviflora (Stephegine) ...	Keim	43	
Odina Wodier	Ghujah or Moru ...	55	*
Phyllanthus Emblica	Aмla	55	
Sleichera Trijuga	Kusam	68	*
Soymida febrifuga	Rohan	65	*
Sterculia Ureus	Kulu	35	
Terminalia Bellerica	Bahera	41	
Xylia Dolabriformis (Ironwood of Burma)	Tamba	64	*
Zizyphus Xylopyra	Ghoti	60	

1. Average weight per cubic foot 50 lb.
2. Require special sanction of the Deputy Commissioner for being cut.
3. The names of the trees have been furnished by Geo. Taylor, Esq., Assistant Conservator of Forests at Chanda.

SUGGESTIONS.

The quantities, qualities, and the prices of the raw materials available in the Chanda district would furnish daily 80 tons of finished iron or steel, saleable at competition and profitable prices in India, and certain other articles for exportation to England.

Rails would give the *smallest* profit, as by the "Thomas Gilchrist" dephosphorising method combined with the Bessemer process, the cheaper pig-iron, containing phosphorus, is worked into rails, the price of which has therefore fallen in Europe by 40 per cent. within the last two years.

Greater will be the profit from kinds of iron which, for the reasons explained on page 8, cannot be made so profitably by means of the Bessemer process, such as small bar-iron, hoop-iron, thin sheet-iron, wire, &c.; in short, all such kinds of goods which have either a small or a complex section.

Most profitable in our case will be articles which can be made *only* of ores of the best quality, and with vegetable fuel. Some of these have been severally and briefly treated of on pages 6 and 7. The chief factor which may in the beginning, mar the full financial success of the Chanda Iron Works lies in the high railway freight prevailing in India.

This incubus on iron work industry will, in the present case, press all the harder, as the railways of the Central Provinces are still insufficiently developed, as a glance at the railway chart may easily prove; but it may be expected that commercial, strategical, and other interests will soon cause the completion of the system to be taken in hand.

In the interest of the prospective iron industries of Chanda, the following extensions or new constructions of railways would be beneficial:—

(1) An extension of the Wardah-Warora line to Hyderabad *via* Chanda.

(2) A junction of the Great Indian Peninsula line at Kamptee with Gadawara or Jubbulpore (Bhosawul-Jubbulpore lines) *vide* Seon.*

(3) A further extension of the latter line through Saugor and Jhansi and a junction with Gwalior.

Should these extensions be decided upon, it would be advisable to utilise the natural resources of the Chanda district in iron works capable of manufacturing all the iron railway material.

---

* North-east of Nagpore.

CHANDA, 19*th April* 1882. RITTER C. VON SCHWARZ.

The following orders, issued by the Government of India in the Home Department, are republished for general information:—

NOTIFICATIONS.—PUBLIC.

Simla, the 7th August 1882.

No. 1194.—In modification of Home Department Notification No. 1617, dated the 7th October 1881, the Governor-General in Council is pleased to declare that licenses for the importation, possession, or transport of sulphur, proved to the satisfaction of the Local Government or Administration concerned to be intended only for *bona fide* medicinal, manufacturing, or agricultural purposes, may be granted without payment of any fee.

JUDICIAL.

The 11*th August* 1882.

No. 1163.—The Hon'ble L. R. Tottenham, a Judge of the High Court of Judicature at Fort William in Bengal, has obtained privilege leave for one month, with effect from the 23rd November next, or from any subsequent date on which he may avail himself of it.

The following order, issued by the Government of India in the Foreign Department, is republished for general information:—

NOTIFICATION.—POLITICAL.

Simla, the 8th August 1882.

No. 341*G.*—His Excellency the Viceroy and Governor-General in Council is pleased to recognise the appointment of Mr. Martin Gutteling, Acting Consul for Sweden and Norway, as Vice-Consul for Sweden and Norway at Calcutta.

The following orders, issued by the Government of India in the Department of Finance and Commerce, are republished for general information:—

Simla, the 10th August 1882.

No. 3078.—Furlough out of India for fifteen months having been granted to Mr. E. F. T. Atkinson, B.C.S., late Officiating Accountant-General, Bengal, and Mr. J. E Cooke having been appointed to officiate temporarily as Accountant-General, Bengal, Mr. Atkinson made over, and Mr. Cooke received charge of the appointment after noon on the 5th August 1882.

The 11th August 1882.

No. 3093.—The following appointments in the Financial Department have been sanctioned, with effect from the 23rd July 1882, inclusive:—

Mr. E. F. T. Atkinson, B.C.S. to be Accountant-General, Bengal.

Mr. Stephen Jacob, B.C.S., is confirmed in the appointment of Under-Secretary to the Government of India in the Department of Finance and Commerce.

The following order, issued by the Government of India in the Public Works Department, is republished for general information:—

NOTIFICATION.—TELEGRAPH.

Simla, the 8th August 1882.

No. 187.—The Governor-General in Council is pleased to order the following addition to No. 47 of the Rules of Inland Telegraph Messages:—

"Application may be made, as above, by an interested party, for the preservation of specified telegrams exchanged between other persons on the ground of pending or contemplated judicial proceedings. Such telegrams will be preserved for a further period of six months, at the expiration of which they will, in default of a renewed application, be destroyed.

"Should the particulars furnished be sufficient to enable the *Check Office* to trace the telegrams at once, the estimated cost of the required search must be deposited by the applicant. It must be understood that the duty of the Telegraph Department in the matter is confined to making the search and preserving the telegrams if found. No information as to the result of the search will be furnished, and any telegrams answering the description given which may be found will only be produced on the order of a competent court of law or other competent authority."

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, AUGUST 23, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following order, issued by the Government of India, Department of Finance and Commerce, is republished for general information :—

Simla, the 28th July 1882.

No. 2715.—The following Declaration between the British and Russian Governments, signed at London on the 9th of June 1882, on the subject of tonnage measurement of vessels, is published for general information :—

The English system of tonnage measurement (Moorsom's system) being henceforward in force as well in the Empire of Russia and the Grand Duchy of Finland as in the United Kingdom of Great Britain and Ireland, and in the British Colonies, the Government of Her Majesty the Queen of the United Kingdom of Great Britain and Ireland, and the Government of His Majesty the Emperor of All the Russias, have agreed to the following Declaration :—

1. Russian and Finland vessels measured according to the abovementioned system shall be admitted into the ports of the United Kingdom and its Colonies; and British vessels measured according to the same system shall be admitted into the ports of Russia or Finland without being subjected, for the purpose of payment of navigation dues, to any fresh operation of measurement.

The navigation dues above mentioned shall be calculated on the net tonnage.

2. The Finland and English Regulations respecting tonnage measurement being substantially the same, English certificates of tonnage measurement shall in the Grand Duchy of Finland, and Finland certificates of tonnage measurement, taken out after the 31st May 1877, shall, in the United Kingdom and its Colonies, be recognized, without any operation of measurement or other formality whatsoever; and the net tonnage of all British or Finland ships inscribed on the ship's papers shall be considered in the respective ports of each country as equivalent to the net register tonnage of national vessels.

3. English certificates of tonnage measurement shall in Russia, and Russian certificates of tonnage measurement, taken out after the $\frac{\text{20th December 1879}}{\text{1st January 1880}}$, shall, in the United Kingdom and its Colonies, be likewise reciprocally recognised in the ports of each country without any operation of measurement.

As, however, the provisions of the Russian Regulation do not entirely correspond to the English Regulations relative to the mode to be followed in the determination of crew spaces in ships, and machine and coal spaces in steamers, the deductions in respect of these shall, for English vessels in Russian ports, be calculated according to the figures shown in the certificates of tonnage measurement, in conformity with the Regulation sanctioned the $\frac{\text{20th December 1879}}{\text{the 1st January 1880}}$, without remeasurement of the vessel.

This measure shall be applicable in British ports to Russian vessels touching there if the captains of the said vessels shall express a desire to that effect; and, in such case, the provisions of the Merchant Shipping Act of the 10th August 1854 shall be complied with.

4. The abovementioned arrangements shall apply also to vessels propelled by any other artificial power than steam.

The present Declaration shall come into operation on the $\frac{\text{1st}}{\text{13th}}$ July 1882, and shall remain in force so long as one of the Contracting Parties shall not have notified to the other six months in advance its intention of terminating it.

In witness whereof the undersigned, duly authorized for this purpose, have signed the present Declaration, and have affixed thereto the seal of their arms.

Done, in duplicate, at London, the $\frac{\text{28th day of May}}{\text{9th day of June}}$ 1882.

(L. S.) GRANVILLE.
(L. S.) LOBANOW.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, AUGUST 30, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[*Reprinted from the Gazette of India.*]

The following order, issued by the Government of India, Legislative Department, is republished for general information :—

NOTIFICATION.

Simla, the 18th August 1882.

No. 9.—CORRIGENDA.—In Act XIV of 1882 (*Code of Civil Procedure*),—

in section 295, clause (*b*), line 1, *omit* the word "is";
in section 588, clause (9), line 2, *for* "or" *read* "for."

The following orders, issued by the Government of India in the Home Department, are republished for general information :—

NOTIFICATIONS.—PUBLIC.

Simla, the 21st August 1882.

No. 1250.—Under the provisions of Section 17 of the Indian Arms Act, 1878, the Governor-General in Council is pleased to direct that no fees shall be charged on transport licenses covering the transhipment of arms, ammunition or military stores at Aden, or at any of the Indian ports named in Rule 6 of the rules framed by the Government of India and published in Notification No. 518, dated 5th March 1879, and also that no fees shall be charged on import and export licenses when required in the case of arms, ammunition or military stores declared under manifest to be consignments without transhipment destined for a foreign port not situated in British India.

The following order, issued by the Government of India in the Revenue and Agricultural Department, is republished for general information :—

EXHIBITION.

The 24th August 1882.

No. 151*Ex.*—An International Exhibition of Colonial productions and articles of general exportation and works of art will be held at Amsterdam in May 1883, to which the Government of India has decided to send samples of raw products, and articles of manufacture other than art or ornamental ware. Exhibits will be ranged under the following classes :—

I.—Animal Products.

1. Wool and hair.
2. Silk, raw, and cocoons.
3. Hides, skins, leather, and horns.
4. Butter, oils, fat, and grease.
5. Fish.
6. Wax and honey.
7. Musk.
8. Others.

II.—Mineral Products.

1. Building materials.
2. Coal.
3. Chemical products.
4. Metals.
5. Other minerals.

III.—Vegetable Products.

1. Cereals and pulses.
2. Other food-grains and tubers.
3. Coffee.
4. Drugs and medicines.
5. Dyeing and tanning materials.
6. Fibrous substances adapted for the preparation of textile fabrics or of paper.
7. Fodder plants.
8. Fruits, nuts, pickles, preserves, and condiments.
9. Hops.
10. Substances used for matting.
11. Oils, oilseeds, and oilcake.
12. Perfumery.
13. Spices.
14. Starches and meals.
15. Sugar and spirits.
16. Tea
17. Tobacco and cigars.
18. Others.

IV.—Manufactured Articles.

1. Carpets and rugs.
2. Cane chairs, &c.
3. Gunny cloths and bags.
4. Mats.
5. Photograph.
6. Rope and cordage.
7. Others.

Exhibits of the above classes will be received from private exhibitors under the following conditions :—

(1) Each sample should not ordinarily exceed 2 ℔ in weight. [This restriction will not apply to such articles as carpets, mats, rope, cordage, &c., which will be taken in a reasonable quantity.]

(2) Freight and all other cost to be paid by the exhibitor up to its arrival at Calcutta. All subsequent charges will be paid by Government.

(3) Samples should ordinary be put up in small cloth bags of a uniform size, the standard size being that capable of containing one ℔. of wheat or rice. Any exhibitor will, however, be allowed to display samples in an ornamental show case, if provided and transmitted to the Exhibition at his own expense.

(4) A label should be attached to each sample on which should be legibly written—

(*a*) Name of district where produced.
(*b*) Name and address of exhibitor.
(*c*) Name of article.
(*d*) Name of variety (if different varieties are sent).
(*e*) Wholesale price of the article at the place of production.

(5) Samples of ordinary articles exceeding 2 ℔ in weight, but not exceeding 40 ℔ (half a maund) will be admitted for exhibition if the exhibitor will pay the freight and provide, or pay for the construction of, suitable cases.

(6) Permission to send exhibits through the Government agency should be obtained before their despatch. Application for permission will not be received after the 1st of December, and the latest date up to which exhibits will be received is 1st of January 1883.

The Government of India has appointed Baboo T. N. Mukharji to superintend operations connected with the collection of exhibits for Amsterdam. Communications which do not require reference to the Government of India should be addressed to Babu T. N. Mukharji, Officer in charge of Amsterdam Exhibits, Revenue and Agricultural Department, Calcutta.

The following orders, issued by the Government of India, Department of Finance and Commerce, is republished for general information :—

NOTIFICATIONS.

Simla, the 14*th August* 1882.

No. 3169.—Mr. Stephen Jacob, B.C.S., is appointed to officiate as Accountant-General Bengal, until further orders.

The 15*th August* 1882.

No. 3159.

ORDER—By the Government of India, Department of Finance and Commerce.

ORDERED that the following despatch, together with the one to which it is a reply, be published in the *Gazette of India* for general information :—

FINANCIAL,
No. 210.

INDIA OFFICE,
London, 6th July 1882.

To His Excellency the Most Hon'ble the Governor-General of India in Council.

MY LORD MARQUIS,—

PARA 1. I have considered in Council your letter, dated the 8th of May, No. 123, referring, for my consideration, an application from A. B., praying that he may be allowed to commute a portion of the pension to which he will be entitled on retirement from the Covenanted Civil Service.

2. With reference to the observation of the Government of the North-Western Provinces and Oudh, that the concession asked for by A. B. would, if conceded generally, be a decided boon to the Service at large, without being in any way prejudicial to the interests of the State, you express considerable doubt whether the main object of the Indian pension system might not be defeated by the grant of such a concession generally. At the same time you believe that such a measure, if restricted to individual officers, would tend to remove a special block in promotion in certain places.

3. You therefore request that, in cases in which you may consider that the retirement of officers of the Covenanted Civil Service would have the effect of removing a block in promotion, you may be permitted to allow such officers to commute the whole, or any part, of the £400 of their annuities in excess of the £600 which was supposed to represent the pension formerly given from the Annuity Funds. You propose to require the usual medical certificate in every case, and to calculate the capital value of the sum commuted by Table C on page 130 of the Codes of the Financial Department.

4. It has not hitherto been the practice to give to civil annuitants the option of commuting any portion of their annuities, partly on the ground that they were able by assigning them to practically effect commutation without the intervention of Government. The terms so obtained are necessarily less favourable than those allowed by this office, and, for this reason, the commutation of a portion of an annuity was recently allowed in one case. I do not, however, desire that this practice should become general.

5. But I see no objection to your proposal, which is accordingly approved, subject to the condition that, in every case, the capitalised sum will be paid in India, the annuity being taken at the rate fixed for its payment in that country.

6 It will rest with your Government to decide whether A. B.'s case is one of those in which the privilege of commutation should be conceded.

I have, &c.,
(Sd.) HARTINGTON.

No. 123. *Simla, 8th May* 1882.

To Her Majesty's Secretary of State of India.

MY LORD MARQUIS,—

We have the honour to refer, for Your Lordship's consideration, an application from A. B., praying that he may be allowed to commute a portion of the pension to which he will be entitled on retirement from the Covenanted Civil Service.

2. In submitting A. B.'s application, the Government of the North-Western Provinces and Oudh remarks that the concession asked for would, if granted generally, be a decided boon to the service at large without being in any way prejudicial to the interests of the State. We beg to observe, however, that we have considerable doubts as to the wisdom of allowing commutation of pensions generally. The main object of the Indian pension system might thereby be defeated. But at the same time we believe that such a measure, if restricted to individual officers, would tend to remove a special block in promotion in certain places. Commutation of pension within certain limits was a part of the remedy applied under the recent arrangements in removing the block in promotion in the North-Western Provinces and elsewhere.

3. Accordingly, we ask Your Lordship's permission to allow officers of the Covenanted Civil Service to commute a portion of their pension in cases in which we may consider that the retirement of the officers will have the effect of removing a block in promotion. The portion of the pension which we would allow to be commuted would be the whole or any part of the £400 in excess of the £600 which was supposed to represent the pension formerly given from the Annuity Funds. A certificate as to the normal prospects of life will be required in every case, and the value of the annuity would be calculated by Table C on page 130 of the Codes of the Financial Department.

The 18th August 1882.

No. 3219.—The following addendum to the Codes of the Financial Department is published for general information :—

C. P. C.

PAGE 54.

Section 106, *Rule* 6.

Add the following to the Rule after the words " Secretary of State ":—

" In the Public Works Department the retention of office may, under the special orders of the Government of India in that Department issued at the time of appointment to the office, be for a less period than five years."

Simla, the 24th August 1882.

No. 3352.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

A question having been raised as to whether stock notes are to be received as collateral security from contractors in the same way as ordinary Government Promissory Notes are received, the Governor-General in Council is pleased to decide that there shall be no distinction between the two classes of notes so far as security deposits are concerned. As, however, the interest on stock notes is payable to bearer and the notes are transferable without endorsement, His Excellency in Council considers that they should always, if possible, be lodged in Government Treasuries for safe custody when tendered as security to any officer of Government. The necessary instructions for their safe custody in Treasuries will be issued in due course by the Comptroller-General.

ORDERED that this Resolution be communicated for information and guidance as follows :—

To the several Departments of the Government of India.
To the several Local Governments and Administrations.
To the Comptroller-General and several Accountants-General.
To the several Heads of Departments administered by the Government of India in this Department.

Ordered also that the Resolution be published in the *Gazette of India* for general information.

The following order, issued by the Government of India in the Military Department, is republished for general information :—

Simla, the 18th August 1882.

FURLOUGH AND LEAVE.

No. 446.—The undermentioned officers are granted furlough out of India, with the necessary subsidiary leave :—

* * * * * * *

Surgeon-Major J. F. P. McConnell, M.B., Professor of Pathology, Medical College, and Resident Physician, College Hospital, Calcutta, (p. a.) for 222 days, under rule IX of the Regulations of 1868.

The following order issued by the Government of India, in the Public Works Department, is republished for general information :—

TELEGRAPH.

The 17th August 1882.

No. 190.—The Governor-General in Council is pleased to order that the following additions and modifications be made to Rules Nos. 37, 41, and 42 of the Rules and Rates for Inland Telegrams :—

Add as footnote to Rule 37—

> "The sender of a State message addressed to a Government official may not prepay a reply; and in the case of a State message addressed to other than a Government official, any sum deposited by the sender under this rule must be intended for no other purpose than to cover the *cost* of a return telegram."

For the present Rules 41 *and* 42 *substitute the following* :—

> "*Rule* 41.—No refund will, under any circumstances, be made for a State message of any class, or for a 'local' or 'deferred' private message; and no refund will be made for an 'ordinary' or 'urgent' private message and delivered wholly or partially in an unintelligible state, unless the extra charge for repetition has been paid by the sender."

> "*Rule* 42.—If an 'ordinary' or 'urgent' private message be not delivered, or be subjected to serious delay through the fault of Telegraph Department, the whole charge made for it will be returned to the sender."

The following order, issued by the Surgeon-General with the Government of India, is republished for general information :—

NOTIFICATION.

Simla, the 27th July 1882.

No. 39.—Third grade Assistant Surgeon Pratab Chunder Ker having returned on the 2nd instant from the leave granted to him in Notification No. 2, dated 11th January 1882, the unexpired portion of his leave is hereby cancelled.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, SEPTEMBER 6, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India in the Home Department, are republished for general information :—

NOTIFICATIONS—PUBLIC.

Simla, the 1st September 1882.

No. 1311.—Under the provisions of Section 17 of the Indian Arms Act, 1878, the Governor-General in Council is pleased to make the following rule, in substitution of the rule contained in Home Department Notification No. 1555, dated the 30th September 1881, regarding the grant of licenses for the possession and transport of gunpowder and fuses required for blasting purposes in connection with agricultural works or works of public utility :—

Rule.

Licenses may be granted to cultivators and other persons, without payment of any fee, entitling the holder to possess and transport gunpowder and fuses in reasonable quantities when the same are proved to the satisfaction of the officer granting the license to be required *bona fide* for blasting purposes in connection with agricultural works or works of public utility.

Such licenses shall be given in the form appended to Notification No. 1555, dated 30th September 1881.

JUDICIAL.

The 1*st September* 1882.

No. 1275.—Her Majesty has been pleased to appoint Jones Quain Pigot, Esquire, Barrister-at-law, to be a Judge of the High Court of Judicature at Fort William in Bengal in the room of the Hon'ble Mr. Justice White, with effect from the 11th July last.

RULES FOR THE FILLING UP OF VACANCIES IN THE CLERICAL ESTABLISHMENTS OF THE SECRETARIAT OFFICES OF THE GOVERNMENT OF INDIA, AND THE DEPARTMENTS DIRECTLY ATTACHED TO THEM, BY COMPETITIVE EXAMINATION.

Nos. $\frac{31}{1298-1308}$.

Extract from the proceedings of the Government of India, in the Home Department (Public),— under date Simla, the 31st August 1882.

Read—

Home Department Resolution Nos. $\frac{31}{1161-66}$, dated the 21st July 1880, on the subject of raising the standard of ability among clerks attached to the Secretariats connected with the Government of India.

RESOLUTION.

The Governor-General in Council has for some time past had under consideration the question of the best mode of filling up vacancies in the clerical establishments of the Secretariat offices of the Government of India, and securing a reasonably high standard of qualification among the assistants employed.

2. The recognized difficulty in all Government offices is to obtain men fit for the superior duties, such as those of drafting, prècis-writing, preparing statistical returns, and the like. The pay provided for the superior appointments is in itself sufficient to give adequate remuneration for the proper performance of duties of this class; but the complaint is general that the standard of work done is at present often very inferior. It has been too much the rule to promote men from the lower grades as a matter of course; and as no test of qualification is applied either on admission to those lower grades, or on advancement beyond them, promotion has come to depend at least as much on seniority and the absence of misconduct as upon any merit or positive fitness for superior duty.

3. The Governor-General in Council has decided that the first step towards reform must be to draw a marked line of distinction between the superior and inferior classes of appointments, and that for this purpose the Secretariat Clerical Service shall for the future be separated into an upper and a lower division,—the former comprising all appointments the pay of which is Rs. 200 and upwards, the latter all appointments (other than those of mere copyists) the pay of which is below that sum. No clerk will be entitled to promotion from the lower to the upper division as a matter of course, or otherwise than in accordance with the rules laid down in this Resolution.

4. As regards the mode of recruiting both upper and lower divisions, the Governor-General in Council has come to the conclusion that the only satisfactory principle to follow is that of free and open competition* modified as regards the upper division by conditions favourable to persons at the present time actually serving in the lower division. The plan of filling up vacancies in the Government offices by competitive examination has worked satisfactorily in the Home Civil Service, and in the few instances where it has been tried in this country. It does away at once with many abuses and difficulties, and seems peculiarly adapted to the circumstances of Indian offices, the responsible heads of which have necessarily no intimate acquaintance with the personal qualifications of candidates for admission, and are driven to rely upon the partial recommendations of subordinates or the certificates of irresponsible outsiders.

* Except in the case of the appointments of Registrars of offices, Superintendents of branches, or Head Assistants, for filling up which an absolute power of selection must remain with the head of the office concerned.

5. It has therefore been determined for the future to hold in Calcutta, and such other places as may be hereafter appointed for the purpose, an examination in January of each year for the purpose of selecting candidates for appointments in the Secretariat offices of the Government of India. These examinations will be under the management of the Board of Examiners, Fort William, assisted by paid Examiners, and acting in communication with the Secretary to the Government of India in the Home Department. The precise dates of the annual examination will be notified in the *Gazette of India* on or before the 30th November previous.

6. The subjects of examination will be the following, all of them being obligatory:—

A.—For Candidates for appointments in the Lower Division.

	Marks.
1. Arithmetic and Elementary Mathematics*	500
2. Geography	250
3. History (English and Indian)	500
4. Handwriting	500
5. Englishing Composition	500
6. Letter drafting and Prècis-writing	1,000

* *i.e.* Algebra up to binomial theorem; and Euclid, Books I—IV.

B.—For Candidates for appointments in the Upper Division.

1, 2, 3, 4, 5, 6. The same subjects and marks as under *A*, but the standard required will be materially higher.	
7. Any special subject of examination prescribed by any particular department	1,000

No candidate will be allowed any marks in respect of any subject of examination unless he shall be considered by the Examiners to shew a competent knowledge of or a real proficiency in such subject. No candidate will be considered qualified who does not obtain at least one-third marks in subjects 4, 5, and 6; and no candidate will be eligible for the Financial Department who does not also obtain at least one-third marks in Arithmetic and Elementary Mathematics.

7. Every candidate for an appointment in the lower division must send a written application for permission to appear at the examination to the Secretary to the Board of Examiners between the 15th and 31st days of December (inclusive). The application should be in the form given on the margin, and be accompanied by a fee of Rs. 10, one-half of which will be returned to unsuccessful candidates.

[FORM.]

To the Secretary to the Board of Examiners,
Fort William.

SIR,

I request permission to present myself at the ensuing examination of candidates for appointments in the lower division of Government clerkships. The fee of Rs. 10 is forwarded herewith.

I am, &c.

With the application must also be forwarded—

1. Evidence that the candidate is not less than 19 and not more than 24 years of age.

2. A certificate from a Government Medical Officer of or above the rank of Assistant Surgeon that the candidate is in good health and of sound constitution.

3. A certificate that the candidate is of good moral character from the head of the institution in which he has last been educated, or (when a year or more has elapsed since his education terminated) from some respectable householder, to whom he is well known in private life, and who is himself personally known to the head of some Government office,—this last fact being certified by the countersignature of the officer in question.

8. Every candidate for an appointment in the upper division must in the same way send a written application for permission to appear at the examination to the Secretary to the Board of Examiners between the dates above specified. The application should be in the form given on the margin, and be accompanied by a fee of Rs. 20, half of which will be returned to unsuccessful candidates. Candidates must forward with the application the evidence of age and certificates of health and moral character prescribed in paragraph 7 above.

[FORM.]

To the Secretary to the Board of Examiners, Fort William.

SIR,

I request permission to present myself at the ensuing examination of candidates for appointments in the upper division of Government clerkships.

The fee of Rs. 20 is forwarded herewith.

I am, &c.

9. The number of candidates to be selected by the Examiners for each division will be notified in the *Gazette of India* by the Home Department on or before the 30th November. This number will be determined, in communication with the heads of the offices concerned with reference to the number of vacancies existing or estimated as likely to occur within the course of the following year, *plus* a margin of 10 per cent. for casualties. In each year after the first the number of appointments to be notified will be reduced by the number of selected candidates remaining on the list from former years who may not yet have received appointments.

10. Every third vacancy occurring during any year in the upper division of an office may be filled up by the head of the office if he think fit, in accordance with the results of a departmental examination of clerks already in the lower division of the same office. In all such examinations subjects 4, 5, and 6, in paragraph 6 above, shall be compulsory. Vacancies which it is intended to fill up under this paragraph will not be reported as vacancies for the purposes of paragraph 9.

11. As soon as practicable after the open competitive examinations, the Board of Examiners will prepare a list of selected candidates in each division in the order of merit, up to the number notified under paragraph 9, if so many are found qualified; and this list will be circulated to the heads of the offices concerned. Candidates will be given their choice of departments as far as possible, and the Board of Examiners will intimate such choice to the head of each office, who will offer the vacant appointments at his disposal to the candidates electing his office in the order in which they stand on the list, and thereafter to the other candidates in the same order, through the Secretary to the Board of Examiners. Priority of selection as between the heads of different offices will be regulated by such orders as the Governor-General in Council may from time to time make in this behalf. (In the case of the Foreign Office, the Secretary shall be at liberty to select any qualified candidate on the list.) It will be open to a selected candidate to decline any particular appointment offered him, and his name will not on that account be removed from the list; but no candidate's name shall remain on the list for either division after he has attained the age of 25 years, or for more than two years after the date of his being entered as a selected candidate.

12. The foregoing rules will govern the case of candidates who are not now serving in the offices to which this Resolution applies. Except as provided in paragraph 10, there will in future be no promotion from the lower to the upper division. But any clerks who are at the date of the issue of this Resolution serving in the lower division may present themselves at any one examination for vacancies in the upper division that may be held in 1883 or 1884; and if they succeed in then obtaining marks indicating a competent knowledge of subjects 1, 2, and 3 (as provided in paragraph 6), and one third marks in subjects 4, 5, and 6, the Board of Examiners will place their names, in order of merit, on the list of selected candidates drawn up under paragraph 11, above the names of all other competitors, irrespective of the fact that these last may have obtained higher marks in the examination. If a candidate whose name has been placed on the list under the provisions of this paragraph declines the appointment offered him, his name will be removed from the list, and he must look for promotion only under paragraph 10. The concession made above in favour of clerks now in the lower division will sufficiently provide for the case of clerks who entered the inferior grades of the service in past years with the expectation of working their way up to higher appointments. No fees will be charged to candidates presenting themselves under this paragraph, but no such candidate will be admitted to the examination who does not at least 15 days before the date of examination submit to the Board of Examiners a certificate from the head of his office declaring that his conduct while serving in the lower division has been satisfactory.

13. All selected candidates receiving appointments will be on probation for twelve months; and if at the close of that period their work has not been found to give satisfaction, they will receive their discharge, and will have no claim to gratuity or compensation on

that account. This rule will not apply to clerks selected for the upper division who were previously permanent clerks in the lower division

14. Candidates accepting appointments must understand that their future promotion in their office within the division to which they belong will depend entirely upon their work and merits. No clerk will have any claim as of right to rise beyond the grade upon which he may have been brought in, though in ordinary course clerks who satisfy the head of their office will receive promotion to vacancies in the division as they occur, new entrants being, as a rule, though not as a matter of course, brought in on the lower grades.

15. Transfers from the upper division of one Government office to that of another, or from the lower division of one office to that of another, may be arranged by the heads of the offices concerned; but no transfer by arrangement from the lower division of one office to the upper division of another can be allowed in future.

16. These orders will apply to the Secretariat offices of the Government of India and departments directly attached to them, such as the Sanitary Commissioner with the Government of India, the Surgeon-General with the Government of India, the Inspector-General of Forests, the Accountant-General, Public Works Department, the Director-General of Railways, and the like.

17. On the occurrence of any vacancy hereafter in any office to which this Resolution applies, when no candidate qualified under these rules is available to fill such vacancy, temporary arrangements may be made by the head of the office to carry on the work until the results of the next examination are known.

ORDER.—Ordered that a copy of the above Resolution be forwarded for information and guidance to all the departments of the Government of India and to the heads of offices under the Home Department, and that the Resolution be published in the Supplement to the *Gazette of India*.

* Surgeon-General with the Government of India.
Sanitary Commissioner with the Government of India.
Secretary to the Board of Examiners.
Registrar of the Calcutta University.

The following orders, issued by the Government of India, Department of Finance and Commerce, are republished for general information :—

NOTIFICATIONS.

Simla, the 31st August 1882.

No. 3466.—The following Addendum to the Codes of the Financial Department is published for general information :—

C. P. C.

PAGE 5.

Section 8, *Rule* 8.

Insert the following Note under the Rule :—

[NOTE.—"Local Government" in Rule 8 means the same "Local Government" that is referred to in Proviso (2) in Section 7, namely, the Local Government under which the officer was serving before his transfer to foreign service or under which he would serve if he left foreign service.]

No.—3470.—Mr. Stephen Jacob, B C.S., received charge of the office of Accountant-General, Bengal, before noon on the 24th August 1882.

The 30th August 1882.

No. 3481.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

READ the following papers having reference to a proposal to authorise the use of postage stamps in payment of the one-anna stamp duty chargeabe on instruments under the Indian Stamp Act, 1879 :—

Despatch to the Secretary of State for India, No. 59, dated 26th August 1881.
Despatch from the Secretary of State for India, No. 94, dated 3rd November 1881.
Circular No. 1979, dated 19th December 1881.
Letter from Chief Commissioner, Central Provinces, No. $\frac{25}{457}$, dated 4th January 1882.
Letter from Chief Commissioner, Coorg, No. 1597-50, dated 6th January 1882.
Letter from the Government of Bombay, No. 500, dated 24th January 1882.
Letter from Chief Commissioner, Assam, No. 575, dated 16th February 1882.
Letter from Chief Commissioner, Ajmer-Merwara, No. 130, dated 23rd February 1882.
Letter from the Government of the Punjab, No 9, dated 25th February 1882.
Letter from the Government of the North-Western Provinces and Oudh, No. 66, dated 15th March 1882.
Letter from the Resident at Hyderabad, No. 141, dated 27th March 1882.
Letter from the Government of Madras, No. 352A, dated 29th March 1882.
Letter from the Government of Bengal, No. 59 (Stamp), dated 14th April 1882.

RESOLUTION.—It is provided by Act 44 Vic., Cap. 12, Section 47, that "any stamp duties of one penny, which may be legally denoted by adhesive stamps not appropriated by any word or words on the face of them to any particular description of instrument, may be denoted by adhesive penny postage stamps."

2. Under this provision penny postage stamps are in the United Kingdom allowed to be used to denote stamp duties of one penny on any of the instruments named in the margin; but several penny postage stamps cannot be used to denote the duty on an instrument liable to a higher rate of duty than one penny. Nor can two half-penny postage stamps be used to denote the duty of one penny. The Governor-General in Council has ascertained that the system has caused no inconvenience, but that on the contrary it has worked well, while the additional facilities afforded to the public have been much appreciated. It is also expected that the system will result in an increase of revenue.

Drafts, receipts, protests, letters of renunciation, policies (other than life policies), proxies, contract notes, delivery orders, certificates of births, deaths, and marriages.

3. In this country a stamp duty of one anna is levied on most of the instruments enumerated above and on a few others, and there can be little doubt that the adoption of a similar system in India would be a very great convenience to the public in the transaction of business, particularly in the matter of receipts. Postage stamps can be obtained everywhere, and many people always keep a supply of them; while receipt stamps can only be procured from stamp vendors, and comparatively few people keep a stock of them. The adoption of the system referred to would, therefore, afford facilities to the public in denoting the stamp duty, and by rendering easier the observance of the law would doubtless increase the revenue.

4. The several Local Governments have been consulted as to the expediency of adopting the system in India, and it appears that all of them approve generally of the proposal. The only objections raised are—

> *1stly*, that it would be difficult to distinguish between postal earnings and the revenue from receipt and other stamps.—a distinction which it is of importance to preserve, both because of the essential difference in the nature of these receipts and because at present stamp revenue is provincial, while postal receipts are imperial;
>
> *2ndly*, that the unified stamp, after being employed for stamping receipts, would be liable to be fraudulently re-used in payment of postage.

The first objection can easily be removed. The amount of the revenue at present derived from one-anna revenue stamps can be readily ascertained, and, with such slight additions as may be requisite in view of the probable normal growth of the revenue from this source, might form the basis for adjustments between Imperial (Postal) and Provincial (Stamp) Revenues.

But the second objection seems to be of a more formidable nature. Against the possible re-use of the stamps after removal of the defacement it would be necessary to provide by printing the unified stamps in doubly fugitive ink, so that any attempt to remove the defacement would involve the destruction of the imprint. This precaution is considered absolutely necessary for the safety of the revenue in the United Kingdom, and would be at least equally necessary in India, while the extra cost will be but small. If this precaution were adopted, there would be little danger of a stamp which had been once used for payment of postage on a letter being employed a second time as a stamp under the Stamp Act, for the Postal Department defaces the stamp in such a manner as to render its fraudulent re-use practically impossible. The danger consists in the possibility of stamps which have once been used in payment of stamp duties being used a second time as postage-stamps,—a danger which arises out of the existing practice which has been encouraged by the Postal Department, under which senders of letters deface the stamps which they put upon their letters, in order to prevent the stamps being removed either before the letters are posted or while in transit through the Post Office.

5. Under Section 11 of the Indian Stamp Act, 1879, a person affixing any adhesive stamp to any instrument is obliged to cancel it, "so that it cannot be used again." He is not obliged to write his name on the stamp, as is the case under the English law. It would be inexpedient to alter the Indian law in such a manner as to bring it into conformity with the English law, as there must be a very large number of persons in India who use the one-anna revenue stamps and who are unable to write. Under these circumstances it is obvious that if a letter were posted the stamp on which had been defaced, it would be impossible for the departmental officers to know whether the stamp in question was one which had been used as a stamp under the Stamp Act, or whether the defacement was merely due to the very general practice already alluded to. It is clear, therefore, that if the reform is to be introduced, the only course open is to prohibit the practice of defacing the postage stamps affixed to letters. By this arrangement any letter received by the Post Office to which a defaced stamp was affixed would be regarded as an unpaid letter.

6. The proposal to adopt the unified stamp, therefore, resolves itself into the question on which side the balance of convenience to the public will lie. On this point the public alone can decide.

7. Before, therefore, taking any final steps to introduce the reform, His Excellency in Council considers it desirable to ascertain the opinion of the European and Native community as to whether it would be more generally acceptable that the public should

have the facility afforded by the use of postage stamps instead of the one-anna revenue stamps, and at the same time incur whatever risks the individual runs in the way of fraud by leaving the stamps attached to letters without any defacement, or whether the public regard the present practice of defacing postage stamps as so essential to their own interests as to make them willing to forego the advantages afforded by using postage stamps in the place of a revenue stamp in order that they may retain it.

8. Should public opinion be in favour of the proposed change, it would probably be necessary to modify the scheme in one particular. It has been already stated that in the United Kingdom the penny postage stamp only is admissible to denote the duty. Two half-penny stamps cannot be used for the purpose. To the course adopted in the United Kingdom there could be no reasonable objection. The penny postage stamp denotes the lowest postage payable for a single letter, and is consequently much more used than any other denomination of postage labels. The half-penny stamp is comparatively little used, and it was probably considered that it was not worth while to print it in the doubly fugitive ink.

9. In this country the case is different. The half-anna postage stamp represents the minimum postage rate for all purposes, and in this respect answers to the penny stamp in England. As regards the convenience of the public, therefore, it is of more importance that the use of the half-anna stamp should be permitted for denoting stamp duty than that the one-anna stamp should be capable of being so used. It will, therefore, probably be necessary if the reform is introduced to allow of the use of either a single one-anna or two half-anna stamps to denote the one-anna stamp duty. This can be effected by the issue of a Notification under Section 9 of the Indian Stamp Act, 1879.

ORDERED that the foregoing Resolution be published in the *Gazette of India*, and that copies be communicated to the Chambers of Commerce, Bengal, Bombay, Madras, and Rangoon.

ORDERED also that copies of the Resolution be forwarded to the several Local Governments and Administrations for communication to other public bodies or associations, and that a copy be sent to the Director-General of the Post Office of India.

The 31*st August* 1882.

No. 3485.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

Read the undermentioned correspondence regarding the printing ink manufactured by Babu Amirta Lal Roy, of No. 35, Barrowaritola Lane, Balliaghatta, Calcutta :—

Letter from Babu Amrita Lal Roy, dated 12th December 1881.
" to the Superintendent, Government Printing (India), No. 2141, dated 23rd December 1881.
" to Babu Amrita Lal Roy, No. 2142, dated 23rd December 1881.
" from Superintendent Government Printing (India), No. 786P, dated 26th January 1882.
" to Superintendent, Government Printing (India), No. 1393, dated 10th March 1882.
" to Government of Bengal, No. 1394, dated 10th March 1882.
" to Governments of Bombay and Madras, No. 1395, dated 10th March 1882.
" from Government of Bengal, No. 37, dated 27th March 1882.
" from Government of Bombay, No. 1414, dated 17th April 1882.
" from Government of Madras, No. 334, dated 22nd April 1882.
" from Superintendent, Government Printing (India), No. 529P, dated 15th August 1882.

RESOLUTION.—In December 1881 Babu Amrita Lal Roy offered to supply printing ink made by him for use in Government Printing Offices, and was requested to send samples of the ink to the Governments of Bengal, Bombay, and Madras, and to the Superintendent of Government Printing, for examination.

2. From the reports which have been received from the Local Governments, and from the Superintendent of Government Printing on the quality of the ink, it appears that, although it is not suited for what is known as "superior book-work," it is sufficiently good for all ordinary purposes and for form printing and at the same time the price is lower than that of the ink procured from England for these purposes.

3. Accordingly, in furtherance of the policy of encouraging Indian industries, the Governor-General in Council directs that the ink required in all Government Presses for the purpose of form printing or for other ordinary printing work shall be procured from Babu Amrita Lal Roy, or from any other local manufacturer, provided that ink of suitable quality is furnished and that the cost is not higher than that of imported ink of similar quality; and the Governor-General in Council also directs that in future no indent for printing ink of a superior quality shall be forwarded to the Secretary of State without first ascertaining that ink of a quality suitable for the work cannot be procured from local manufacturers.

ORDERED that the foregoing Resolution be communicated to all Local Governments and Administrations, and to the Superintendent of Government Printing (India), Calcutta, for information and guidance.

Ordered also that a copy of the Resolution be forwarded to Babu Amrita Lal Roy, and that it be published in the *Gazette of India*.

The following order, issued by the Government of India, Military Department, is republished, for general information :—

Simla, the 1st September 1882.

FURLOUGH AND LEAVE.

No. 473.—The undermentioned officers have been granted extensions of furlough by the Right Hon'ble the Secretary of State for India :—

* * * * * * * *

Captain H. Boileau, Bengal S. C., (p. a.) for 183 days.

* * * * * * * *

Brigade-Surgeon J. Jones, M.D., (p.a.) for one year.

The following orders, issued by the Surgeon-General with the Government of India, are republished for general information :—

NOTIFICATIONS.

Simla, the 8th August 1882.

No. 42.—Third grade Assistant Surgeon Tinkari Mukerjee, of the supernumerary list, is granted leave of absence on medical certificate for six months.

The 15th August 1882.

No. 43.—The services of third grade Assistant Surgeon Kasi Nath Ghosh, of the supernumerary list, are placed at the disposal of the Chief Commissioner, British Burmah, for employment in that province.

The 19th August 1882.

No. 44.—Third grade Assistant Surgeon Mohendra Mohun Basu, of the supernumerary list, is granted two months' leave of absence on medical certificate and without pay.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, SEPTEMBER 13, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[*Reprinted from the Gazette of India.*]

The following orders, issued by the Government of India in the Foreign Department, are republished for general information :—

POLITICAL.

Simla, the 29th August 1882.

No. 551*G.*—His Excellency the Viceroy and Governor-General in Council is pleased to recognise the appointment of Mr. William Bleeck as Consul for Germany at Calcutta.

The 4th September 1882.

No. 588*G.*—With reference to notification No. 184GP, dated 1st June 1882, the recognition by the Government of India of the appointment of Mr. Oscar Trefftz as Acting Consul for the Netherlands at Calcutta during the absence of Mr. E. Van Cutsem has been confirmed by Her Majesty's Government.

No. 591*G.*—With reference to notification No. 187GP, dated 1st June 1882, the recognition by the Government of India of the appointment of Mr. Alfred Zunini as Honorary Vice-Consul for Italy at Calcutta has been confirmed by Her Majesty's Government.

The following order, issued by the Government of India in the Department of Finance and Commerce, is republished for general information :—

NOTIFICATION.

Simla, the 8th September 1882.

No. 3637.—The following corrigendum to the Codes of the Financial Department is published for general information :—

C. P. C.

PAGE 97.

Section 177*A.*

Strike out the parenthetical sentence "(For the purposes of this Section service paid by a Guaranteed Railway Company shall be treated as if it were service rendered in a temporary capacity)," in this section.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, SEPTEMBER 20, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India in the Home Department, are republished for general information:—

NOTIFICATIONS—PUBLIC.

Simla, the 15th September 1882.

No. 1435.—Under the provisions of Section 17 of the Indian Arms Act, 1878, the Governor-General in Council is pleased to make the following rule for the replacement of licenses granted under that Act which may be lost or destroyed:—

Rule.

19*a*. When a license granted in accordance with these rules is lost or accidentally destroyed, a duplicate may be granted to the licensee on payment of the same fee as he paid on the original license if not in excess of one rupee, and in any other case on payment of a fee of one rupee.

Cultivators or other persons to whom licenses may have been granted without payment of any fee may obtain duplicates of such licenses, if lost or destroyed, free of all fee.

No. 1448.—Under the provisions of Section 17 of the Indian Arms Act, 1878, and in continuation of Home Department Notification No. 1311, dated the 1st instant, the Governor-General in Council is pleased to make the following rule regarding the grant of licenses for the possession and transport of gunpowder and fuses required for blasting purposes:—

Rule.

Licenses may be granted to contractors and other persons without payment of any fee, entitling the holder to possess and transport gunpowder and fuses in reasonable quantities when the same are proved to the satisfaction of the officer granting the license to be required *bona fide* for blasting purposes.

Such licenses shall be given in the form appended to Notification No. 1555, dated 30th September 1881.

The following order, issued by the Government of India in the Foreign Department, is republished for general information:—

NOTIFICATION.—GENERAL.

Simla, the 14th September 1882.

No. 698*G*.—The services of Mr. H. H. Birch are placed temporarily at the disposal of the Government of Bombay for employment as guardian to the Maharaja of Kolhapur.

The following orders, issued by the Government of India in the Department of Finance and Commerce, are republished for general information :—

NOTIFICATIONS.

Simla, the 15th September 1882.

No. 3735.—The following Addendum to the Codes of the Financial Department is published for general information :—

P. & A. A. C.

PAGE 260.

Section 5.

Add the following Proviso to this Section:—

Provided always that the emoluments of the acting officer, whether appointed to act at the same station or deputed to act from another station, shall not, for any time during the 30 days, be (1) less than the salary which, but for his present appointment, would be admissible to him for such time, or (2) more than the salary admissible to him after the days referred to.

No. 3742.

RESOLUTION—By the Government of India, Department of Finance and Commerce.

The Governor-General in Council is pleased to the prescribe following rules for regulating the payment of stock notes alleged to have been lost or destroyed :—

1. When any person desires to make a claim for the value of a stock note alleged to have been lost or destroyed, he should at once produce before the District Officer all the evidence he can produce regarding the circumstances of the destruction or loss of the note, which must be absolutely identified. The District Officer may either reject the claim, or, if he is of opinion that the evidence establishes beyond doubt the impossibility or extreme improbability of the note ever being presented, he should record his opinion to this effect and forward it to the Comptroller-General. The latter, if he agrees as to the effect of the evidence, may direct as follows :—

(1) That the loss of the note be advertised in the *Gazette of India* and the local Government Gazettes, and that after two years from the first advertisment of the loss the value of the note may paid by the District Officer and invested, if possible, in Government securities, or, if the amount is too small, then paid into the Government Savings Bank.

(2) That after twenty years from the date of advertisement, if meantime the note has not been presented for payment, the said investment, with accumulated interest (or the said deposit, if no investment has been made) be delivered to the claimant or his assignee, or other legal representatives, upon a bond of indemnity with two personal sureties attached.

2. If the Comptroller-General think that the circumstances warrant more favourable terms to the claimant, he may, if he think fit, submit the case to the Government for orders; but this is not to be done unless the evidence establishes a claim of Rs. 100 at least; nor is the period after which delivery to the claimant may be made to be reduced, under any circumstances, below five years.

ORDERED that these rules be published in the *Gazette of India* for general information, and communicated to the Comptroller-General for information and guidance.

The following order, issued by the Government of India in the Military Department, is republished for general information :—

Simla, the 15th September 1882.

FURLOUGH AND LEAVE.

No. 495.—The undermentioned officers have been granted extensions of furlough by the Right Hon'ble the Secretary of State for India :—

* * *

Surgeon E. Bovill, M.B., (p. a.) for 182 days.

F. B. PEACOCK,

Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, SEPTEMBER 27, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[*Reprinted from the Gazette of India.*]

The following Extraordinary, issued by the Government of India in the Department of Finance and Commerce, is republished for general information :—

NOTIFICATION.—Accounts and Finance.

Simla, the 26th September 1882.

The Governor-General in Council has determined to borrow Two Hundred and Fifty Lakhs of Rupees, being the amount required for the public service.

The following Notification is therefore published :—

FOUR PER CENT. LOAN.

His Excellency the Right Hon'ble the Governor-General in Council has resolved to borrow Two Hundred and Fifty Lakhs of Rupees for the public service in the following manner.

2. Promissory Notes will be issued for the said amount in Form A annexed to this Notification, being the form of the notes of *The Four Per Cent. Loan of* 1842-43, of which Loan the notes to be now issued will form a part. All the conditions which apply to notes of *The Four Per Cent. Loan of* 1842-43, will apply to the notes to be now issued.

3. Tenders for the whole or any part of the said amount of Two Hundred and Fifty Lakhs of Rupees will be received by the Comptroller-General from this date to noon of Wednesday, the 1st November 1882. Tenders must be in even hundreds of rupees not less than 500 Rs.

4. Each tender must be addressed, in the form annexed to this Notification, to the Comptroller-General, Calcutta, and enclosed in a sealed cover, superscribed, "*Tender for the Four Per Cent. Loan,* 1882." If the tenderer is not resident india, he must name an agent resident in India to whom a letter of allotment may be issued if any part of the loan is allotted to such tenderer.

5. Each tender must be accompanied by a receipt from one of the Banks of Bengal, Madras, or Bombay, or one of their Branches, or from an Officer in charge of some public Treasury, or by a cheque drawn in favour of the Comptroller-General on a Bank in Calcutta, Madras, or Bombay, or by* Government Promissory Notes, standing in the name of or endorsed to the tenderer or the person making the deposit, for not less than one-hundredth, or, if the tender be for less than Five Lakhs of Rupees, then for not less than one-fiftieth part of the tender. If the allotment is not fully taken up, this deposit of one or two per centum will be forfeited; and if one or more Government Promissory Notes have been deposited, such note or notes will be appropriated by the Government and cancelled; otherwise, if the deposit is in cash, it will be treated as in part payment of the last instalment. A cash deposit may, after acceptance of the tender in support of which it is made, be replaced by a Government Promissory Note, as aforesaid.

6. The rate at which a tender is made must not contain a fraction of an anna : if a rate containing a fraction of an anna is inserted in any tender, such fraction will be struck out and the tender treated as if the rate did not contain such fraction of an anna.

7. The rate at which each tender is made must be specified in rupees or rupees and annas : a tender in which no rate is thus specified, but a subscription is offered in some other terms, as, for example, at the recorded minimum, or at some specified percentage in addition to the recorded minimum, or at the average of the accepted tenders, will be rejected as null and void.

8 The minimum rate at which tenders will be accepted will be recorded under the signature of the Comptroller-General, and, before the tenders are opened, placed upon the table in a sealed envolope, but will not be declared unless some tender is rejected only because it is below the recorded minimum.

9 Tenders will be opened, publicly, by the Comptroller-General at the Currency Office, No. 1, Dalhousie Square, Calcutta, at noon on Wednesday, the 1st November 1882; but the contents of the tenders will not be disclosed otherwise than as provided in clause 11.

10. Tenders at the recorded minimum rate, and at rates above the recorded minimum rate, will be accepted in the order of the rates tendered, beginning with the highest rate; the amount allotted at the lowest rate at which tenders are accepted, will be divided amongst those who have tendered at this rate, in proportion, as nearly as may be found convenient, to the amounts of their tenders.

11. As soon as possible after the 1st November 1882, letters of allotment will be issued to those persons whose tenders are accepted in whole or in part, or to their agents ; and an alphabetical list of the names of those to whom such letters of allotment are issued will be posted, for general information, at the Head Offices of the Banks of Bengal, Madras, and Bombay.

12. Payment of any accepted tender may be made to the account of the Government in the Head Office of one of the Banks of Bengal, Madras, or Bombay, or in any Branch of these Banks, or into any public Treasury or Treasuries in India which may be named in the tender.

13. Accepted tenders must be paid, in equal instalments, as follows—

One-third on or before Wednesday, the 15th November 1882.
One-third on or before Monday, the 11th December 1882.
One-third on or before Thursday, the 28th December 1882.

but the whole or any part of any accepted tender may be paid at any time after receipt of the letter of allotment.

14. Interest upon each payment will be promptly paid in advance, at the rate of four per centum per annum, from the date of such payment to the last day of January 1883. But, at the option of the allottee and on his paying interest from the first day of August 1882, to date of payment, interest will run from the said first day of August.

15. Scrip receipts for instalments paid will be given by the Banks of Bengal, Madras, and Bombay, or their Branches, or by the Officers in charge of the Government Treasuries at which payment is made. These receipts will, as soon as possible, be exchanged for Promissory Notes issued under this Notification.

16. Any holder of an allotment may at his option, by paying interest for the difference of time upon any amounts paid up after November 1st, 1882, receive in lieu of Promissory Notes in Form A, either Promissory Notes with coupons attached, or Stock Certificates (Form B) with coupons attached, and payable to bearer, in accordance with the Loan Notification of this Department, dated 27th June 1881 (*i. e.*, *The four Per Cent. Loan of* 1881, forming part of *The Four Per Cent. Loan of 1st May* 1865). In such cases the first coupon issued will be that which falls due on 1st May 1883.

FORM *A* OF PROMISSORY NOTE—(*See Clause* 2).

FORT WILLIAM, THE 1ST OF FEBRUARY 1843.

Promissory Note *Government Rupees* *at four per cent.*
No. *of* 1842-43.

The Governor-General of India in Council does hereby acknowledge to have received from
the sum of Government Rupees Five Hundred as a Loan to the Secretary of State in Council for India, and does hereby promise, for and on behalf of the said Secretary of State in Council, to repay the said Loan, by paying the said sum of Government Rupees Five Hundred to the said
his Executors, or Administrators, or his or their Order, on demand, at the General Treasury at Fort William, after the expiration of Three months' Notice of Payment, to be given by the Governor-General of India in Council, in the *Government Gazette*, and to pay the interest accruing on the said sum of Government Rupees Five Hundred from the 1st February 1883 (Eighty-three), at the rate of four per cent. per annum by half-yearly payments, at the General Treasury of Fort William, to the said
his Executors, or Administrators, or his or their Order,
until the expiration of three months after such notice of payment as aforesaid, when the amount of interest due will be payable with the principal, and (such notice being considered

---

* *It is particularly requested that such Promissory Notes may NOT be endorsed to the Comptroller-General.*

as equivalent to a tender of payment at the period appointed for the discharge of this note) all further interest shall cease.

FORM *B* OF COUPONED CERTIFICATE.

INDIA FOUR PER CENT. RUPEE LOAN, 1865

Redeemable at any time after three months' notice in the "Gazette of India."

Certificate

Rs. 000 No.

This is to certify that the bearer of this Certificate is entitled, under the Notification of the Government of India of the 27th June 1881, to Government Rupees India Four Per Cent. Loan, 1865, payable Three Months after Notice, which may be published in the *Gazette of India* at any time.

No. . Rs.

Calcutta, 1*st November* 1881.

The coupons attached to this Certificate, as well as the principal sum herein named, are payable to bearer at the Government Treasury at Calcutta only.

FORM OF TENDER—(*See Clause* 4).

I, *A.B.*, hereby tender for Rupees (*X*) *of The Four Per Cent. Loan*, 1882, advertised in the notification published in the *Gazette of India Extraordinary*, dated the 26th September 1882, and agree to pay for the same, subject to the conditions notified, at the rate of Rupees (*Y*) Annas (*Z*) for every hundred rupees allotted to me.

I enclose a *deposit receipt** for Rupees (*XX*), and engage, if my offer be accepted, to pay to the account of the Government at the Bank of† (or at the† Branch of the Bank of† ; or into the Public Treasury at† , as the case may be) the first instalment of one-third on or before Wednesday, the 15th November 1882, and the several later instalments on or before the dates fixed by the said Notification as follows:—

One third on or before Monday, 11th December 1882.
One-third on or before Thursday, 28th December 1882.

* Or Cheque or Government Promissory Note.

† Here enter the name of Bank, Branch Bank, or Treasury.

Any allotment made to me may be communicated to *C.D. at.*‡

‡ Here insert C.D.'s address, which must be in India. This paragraph should only be inserted if A.B. does not reside in India.

NOTE.—(1)—*A separate tender must be made at each rate tendered, and each tender must be supported by a separate deposit, and must be in even hundreds of Rupees not less than* 500 *Rs. As a precaution against mistakes, the tender, or, at least, the name of the tenderer and the amount and rate tendered, should be written in English. The rate tendered should be the whole amount per centum, not the premium or discount: thus:—"One hundred and two," or "One hundred," or "Ninety-nine;" not "Two per cent. premium," or "Par," or "One per cent. discount."*

NOTIFICATION BY COMPTROLLER-GENERAL.

TENDERS FOR LOAN.

In order to secure the early return of deposits made with unaccepted tenders for the new Loan, the Comptroller-General notifies the following arrangements:—

1. For all tenders presented to him in his Office upon the last fixed day, or the two days preceding it, he will give the bearer a receipt bearing a number, and initialled by himself or an assistant specially deputed for the purpose.
2. The reverse of this receipt is a form in which the tenderer may give to the Comptroller-General a receipt for the deposit accompanying it. This form should, on the third day after the opening of the tenders, be filled up, signed with the same signature as the tender, and be presented at the Office of the Comptroller-General. The deposit will then be returned to the bearer, in exchange for the receipt.
3. Deposit upon tenders presented personally, as described in No. 1, above, will be returned only in this way, and will not be sent by post, or otherwise. Deposits upon other unsuccessful tenders will be returned by post, or by the hands of a clerk.
4. The Comptroller General requests that, in order to facilitate the business of his Office, tenderers will—
    (1) use the printed forms which will be avilable at his Office and at the Currency Office, on application to the Durwan on duty,—at all the Provincial Account Offices, and at the Banks of Bengal, Madras, and Bombay:
    (2) if they make more than one tender, put *each* in a separate close cover:
    (3) if the deposit is in the form of Promissory Notes or of Currency Notes, quote their number in detail in the tender.

The following orders, issued by the Government of India in the Foreign Department, are republished for general information :—

NOTIFICATIONS.—POLITICAL.

Simla, the 16th September 1882.

No. 718G.—With reference to notification No. 129GP, dated the 21st April 1882, the recognition by the Government of India of the appointment of Mr. C. C. Bancroft as Vice and Deputy Consul-General for the United States of America at Calcutta, has been confirmed by Her Majesty's Government.

No. 721*G.*—His Excellency the Viceroy and Governor-General in Council is pleased to recognise the appointment of M. G. Lemaire as Consul-General for France at Calcutta.

The following orders, issued by the Government of India in the Military Department, are republished for general information :—

VOLUNTEER CORPS.

Simla, the 22nd September 1882.

No. 508.—*Calcutta Volunteer Rifle Corps*—

Mr. William James Gardiner, to be Lieutenant, *vice* Lieutenant L. E. D. Rose, resigned.

FURLOUGH AND LEAVE.

No. 513.—The undermentioned officers have been granted extensions of furlough by the Right Hon'ble the Secretary of State for India :—

* * * * *

Major W. Hopkinson, General List, Infantry, (p. a.) for ninety days.

The following order, issued by the Government of India in the Military (Marine) Department, is republished for general information :—

ORGANISATION.

Simla, the 22nd September 1882.

No. 30.—The Office of the Superintendent of Marine Surveys at Calcutta having been closed, the business connected with that office will henceforth be conducted by the Director of the Indian Marine, to whom all correspondence on the subject of the marine surveys of India will be addressed in future. The compilation of the Wreck Register, which has hitherto been prepared in the office of the Superintendent of Marine Surveys, Calcutta, has been transferred, with the concurrence of the Government of Bengal, to the Port Officer, Calcutta, to whom correspondence on the subject will in future be addressed.

The following order, issued by the Surgeon-General with the Government of India, is republished for general information :—

NOTIFICATION.

Simla, the 8th September 1882.

No. 45.—Third grade Assistant Surgeon Annoda Prosad Das, of the supernumerary list, is granted leave of absence for six months without pay.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, OCTOBER 4, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[*Reprinted from the Gazette of India.*]

The following order, issued by the Government of India in the Military Department, is republished for general information :—

Simla, the 29th September 1882.

No. 532.—VOLUNTEER CORPS—

Calcutta Volunteer Rifle Corps.

Corporal David Jardine Paterson to be Lieutenant, *vice* Lieutenant J. Stevenson, resigned.

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, OCTOBER 11, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[*Reprinted from the Gazette of India.*]

The following orders, issued by the Government of India in the Home Department, are republished for general information:—

NOTIFICATION.—MEDICAL.

Simla, the 3rd October 1882.

No. 420.—The services of Surgeon L. A. Waddell, M.B., Officiating Medical Officer, 30th Native Infantry, are placed temporarily at the disposal of the Government of Bengal.

EDUCATION.

The 6th October 1882.

No. 509.—The following despatch from Her Majesty's Secretary of State for India and its enclosure are published for general information:—

PUBLIC,
Educational.
No. 96.

INDIA OFFICE;
London, 31st August 1882.

To His Excellency the Most Hon'ble the Governor-General of India in Council.

MY LORD MARQUIS,—I forward herewith, for the information of Your Excellency in Council, and for the necessary publication, copy of a letter* received from the Gilchrist Trustees, announcing their intention to substitute, from January 1884, one scholarship annually for India, at £150 a year, tenable for four years, and conditionally for five years, in place of the two scholarships at £100 a year, and tenable for four years now offered by them.

* 8th August 1882.

I have, &c.,
(Sd.) HARTINGTON.

4, BROAD SANCTUARY,
Westminster, S.W., 8th August 1882.

To Sir Louis Mallet, C.B.

SIR,—I have the honour of informing you by direction of the Gilchrist Trustees that in consequence of the very limited competition for the *two* scholarships, each of £100 per annum for four years, at present annually offered by them to Natives of India, they have decided to withdraw these and to institute in place of them a *single* scholarship of £150 per annum for four years to be extended to *five*, if the scholar should prove himself worthy: this scholarship to be awarded by competitive examination in the same manner as at present.

The *two* scholarships will be awarded as hitherto, in January 1883, and the *single* scholarship will be substituted for them in January 1884.

I have to request that you will cause this change in the terms of the Gilchrist scholarships to be made known in India, and remain, &c.

(Sd.) W. B. CARPENTER.

The following order, issued by the Government of India, Revenue and Agricultural Department, is republished for general information :—

NOTIFICATION.—SURVEYS.

Simla, the 6th October 1882.

No. 438*S*.—Mr. Juels Schaumburg, Artist, Geological Survey Deparment, is granted privilege leave of absence for one month, with effect from the 1st October 1882, or any subsequent date on which he may avail himself of it.

The following order, issued by the Government of India in the Department of Finance and Commerce, is republished for general information :—

NOTIFICATION.

Simla, the 5*th October* 1882.

No. 4174.—The following addendum to the Codes of the Financial Department is published for general information :—

C. L. C.

PAGE 149.

Section 35.

After "any" in the *second line of clause* (3) *insert* "balance of."

F. B. PEACOCK,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, OCTOBER 18, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following orders, issued by the Government of India, Foreign Department, are republished for general information :—

NOTIFICATIONS.—General.

Simla, the 10th October 1882.

No. 952 *G.*—Major F. A. Wilson, s.c., Political Agent, 3rd Class, Officiating Political Agent, 2nd Class, and Agent to the Governor-General with the King of Oudh and Superintendent of Political Pensions, is granted one month's privilege leave, with effect from the 23rd September 1882, or any subsequent date upon which he may avail himself of the same.

No. 954 *G.*—Major L. J. H. Grey, c.s.i., s.c., Officiating Secretary to the Board of Examiners, Fort William, is appointed to discharge the current duties of the Agent to the Governor-General with the King of Oudh and Superintendent of Political Pensions in addition to his own duties, with effect from the date of assuming charge, during the absence on privilege leave of Major F. A. Wilson.

The following order, issued by the Government of India in the Department of Finance and Commerce, is republished for general information :—

NOTIFICATION.

Simla, the 13th October 1882.

No. 4282.—The following addendum to the Codes of the Financial Department is published for general information :—

P. & A. A. Code.

Pages 268 and 269.

Section 25.

Add the following Clause to this Section :—

"(*e*) To an officer of the Subordinate Revenue Establishment of State Railways acting in an office ordinarily held by an officer of the Superior Revenue Establishment,—Rs. 75, provided that the charge involves duties and responsibilities which in character and extent are such as are not ordinarily imposed on subordinate officers."

F. B. Peacock,
Offg. Secy. to the Govt. of Bengal.

The Calcutta Gazette.

WEDNESDAY, OCTOBER 25, 1882.

PART IA.

Orders and Notifications by the Government of India, &c.

[Reprinted from the Gazette of India.]

The following order, issued by the Government of India in the Department of Finance and Commerce, is republished for general information :—

No. 4323.

ORDER—By the Government of India, Department of Finance and Commerce.

Read the following :—

No. 1199, dated 7th September 1882.

From—A. P. MacDonnell, Esq., Officiating Secretary to the Government of Bengal, General Department,

To—The Secretary to the Government of India, Department of Finance and Commerce.

I am directed to report, for the information of His Excellency the Governor-General in Council, that on receipt of the Resolutions of the Government of India noted on the margin, copies were forwarded to the Board of Revenue and all indenting Heads of Departments subordinate to this Government, with a request that enquiries might be made and reports submitted regarding the extent to which it was possible to substitute articles of local manufacture for similar articles at present procured through the Store Department of the India Office.

No. 3170, dated the 21st September 1881.
No. 2116, dated the 21st December 1881.

2. Replies (copies enclosed) have now been received from the Board and from the officers consulted ;* and I am now to forward a copy of the orders which the Lieutenant-Governor has issued on the subject.

* Chemical Examiner to Government.
Superintendent of Government Printing.
Superintendent of Stationery.
Director of Public Instruction.

3. The Lieutenant-Governor regrets that the employment of articles of Indian manufacture is not yet possible on a larger scale than that indicated in the orders issued; but all Heads of Departments have been directed to use their best endeavours to satisfy their requirements locally if possible, and it is hoped that in future years tenders, especially for articles of stationery, may be forthcoming more freely than at present. Mr. Rivers Thompson has observed with satisfaction that, in the offices of the Collector of Customs and of the Superintendent of Government Printing, articles of local manufacture are employed to a very considerable extent.

No. 217C, dated 7th March 1882.

From—C. J. H. Warden, Esq., Chemical Examiner to Government,

To—The Secretary to the Government of Bengal, General Department.

I have the honour to acknowledge receipt of your circular No. 39 of the 1st December 1881, regarding cheapest mode of obtaining goods of Indian manufacture for articles now obtained from England, and in reply beg to state that some of the chemicals used in my Department can be purchased locally ; but, as far as I am aware, chemical apparatus are not manufactured in India, and must, as hitherto, be obtained from Europe.

No. 1165, dated 29th August 1882.

From—C. S. Bayley, Esq., Offg. Under-Secy. to the Government of Bengal, General Department,

To—The Chemical Examiner to Government.

With reference to your letter No. 217C, dated the 7th March 1882, I am directed to request that you will be good enough to purchase locally, as far as possible, all chemicals required by you.

No. 385M, dated 3rd March 1882.

From—E. M. LEWIS, ESQ., Superintendent, Government Printing, Bengal,
To—The Under-Secy. to the Govt. of Bengal, Revenue and General Departments.

With reference to circular No. 39 of the 1st December 1881, and reminder No. 39-1 dated 20th February, I have the honour to report that, of the items in the list circulated with the Government of India Resolution No. 3170 of the 21st September 1881, the following forty only are purchased by the Press, such of the remainder as are used in the Press being supplied by the Stationery Office :—

1. Twine.
2. Locks.
3. Scissors.
4. Padlocks.
5. Pasteboard.
6. Longcloth.
7. Tape wicks.
8. Sulphuric acid.
9. Longcloth for covering books.
10. Mercury.
11. Oil, cocoanut.
12. Blank books.
13. Hides.
14. Chalk.
15. Glue-pots, large.
16. Scissors, large.
17. Calico, black.
18. ,, white.
19. Glue, best English, for bookbinding.
20. Brass dotted rule.
21. Brass waved rule.
22. Teakwood cases.
23. Case racks for 28 cases.
24. Silk headbands.
25. Form racks for four forms.
26. Lye trough.
27. Galley washing trough.
28. Lye preparation, including cask.
29. Galleys, large, brass-bottomed, 18″×15″.
30. Chases, 1 page cap.
31. Ditto, 2 ditto.
32. Galleys, brass, with wooden rims, internal measurement 24″×10″.
33. Blankets, Napier's fine.
34. Scissors, pressmen's.
35. Thread, Europe.
36. Disinfecting powder.
37. Hammers.
38. Candle stands.
39. Paste.
40. Mallets and planers.

For convenience of arrangement the above may be divided under three heads—viz. (1) articles which are already obtainable of local (native) manufacture; (2) articles which can be made to order locally; (3) articles the majority of which may for some time to come have to be obtained of European manufacture.

Under the first head come twine, sulphuric acid, mercury, cocoanut oil, hides, chalk (common), glue, lye—for lye, fuller's earth (saji mutty) is universally used in Calcutta,—candle stands, and paste, all of which can be procured in Calcutta of native production or manufacture, the glue only being imported from the Straits or China.

Under the second head come pasteboard, blank books, large glue pots, teakwood cases and case and form racks, lye troughs, galley washing troughs, large brass-bottomed galleys and brass galleys with wooden rims, chases of all sizes, mallets and planers. Pasteboard and blank books of native manufacture are readily obtainable; they are also made at the Jail Press for the Stationery Office in large numbers; and now chases of all sizes and case and form racks are also made by convict labour. Chases and racks, together with the remaining articles under this head, are also made by native mistries at a cost generally much below that of the imported article, the requirements of this Press and of the Jail Press having been supplied by native mistries for some time past.

Under the third head are included all the remaining items, viz. locks, scissors, padlocks, longcloth, tape wicks, longcloth for covering books, large scissors, calico (white and black), brass rule of all kinds, silk headbands, printers' blankets, pressmen's scissors, English thread, disinfecting powder and hammers. The majority of these items may for some time to come have to be obtained of European make; and it occurs to me that perhaps the most economical way of procuring them would be by the formation of a central store in conjunction with an already existing department having frequent dealings with the bazar.

If this department made all purchases when articles had to be purchased locally (or indented for them through the Secretary of State, after ascertaining the particular requirements of each department, when that course could be conveniently followed), the Government should be able to obtain better terms than if each head of an office or department made his purchases direct from the dealer. The Stationery Office being now the principal office of supply, I should say that that office would be the best suited to undertake the charge of these additional stores. The Head of that office might also be instructed to watch and encourage the development of native manufacture, and to introduce the locally-made article in place of the imported whenever opportunity offered. Articles such as scissors, locks, &c., are required in such small numbers by individual officers that it would scarcely be possible to bring about, through the agency of the latter, the results aimed at by the Government of India; but well directed efforts on the part of the head of a central office might soon effect most important changes.

No. 1175, dated 31st August 1882.

From—C. S. BAYLEY, ESQ., Offg. Under-Secretary to the Government of Bengal, General Department,
To—The Superintendent of Government Printing, Bengal.

Twine, sulphuric acid, mercury, cocoanut oil, hides, chalk, glue, lye, fuller's earth, candlestands, and paste.

With reference to your letter No. 385M, dated the 3rd March 1882, I am directed to request that you will be good enough to continue to purchase locally the articles noted on the margin, and that you will for the future procure the following articles locally if possible :—Pasteboards, blank books, large glue pots, teakwood cases and case and form racks, lye troughs, galley washing troughs, large brass-bottomed galleys and brass galleys with wooden rims, chases of all sizes, mallets and planers.

2. With regard to your opinion that the Government would be able to obtain articles required on better terms if the Stationery Office were to make all local purchases of articles than if each Head of an office or department makes separately his own purchases direct from the dealer, the Lieutenant-Governor desires that you will put yourself in communication with the Superintendent of Stationery. In any case in which it may seem expedient to do so, the Lieutenant-Governor is willing that you should procure articles of local manufacture through the Superintendent.

No. 1176.

Extract paragraph 2 forwarded to the Superintendent of Stationery for information and guidance.

No. 5897, dated 10th March 1882.

From—W. H. RYLAND, ESQ., Officiating Superintendent of Stationery, Calcutta,
To—The Secretary to the Government of Bengal, General Department.

In reply to your circular No. 39, dated 1st December 1881, forwarding copy of the Resolution of the Government of India, No. 3170, dated 21st September 1881, with a list of articles procurable of Indian manufacture, and requesting that enquiries may be instituted as to the cheapest and most convenient way of obtaining in future regular supplies of such goods in place of similar articles hitherto procured of European manufacture, I have the honour to report that, having compiled from the list a statement of such articles as relate to this department, together with the sources of supply referred to in this and in previous Government Resolutions, I advertised in two of the commercial advertising papers in Calcutta a list of the articles required for the ensuing year, for which I was prepared to receive tenders, copy* of which is annexed, and likewise specially addressed the undermentioned manufacturing companies and individuals, calling attention to the advertisement and offering to supply samples and particulars of any articles for which they might be enabled to tender :—

* Enclosure A.

Messrs. Apcar & Co., Calcutta.
,, Jessop & Co., ,,
,, Fraser & Miller, Bombay.
,, Richardson & Cruddas, Bombay.
Superintendent, Government Workshop and Foundry, Roorkee.
Superintendent of the Workshops, Government Dockyard.
Manager, Cotton Mills, Bombay.
,, ,, Cawnpore.
,, ,, Calcutta.
Agents, Bally Paper Mills.
Manager, Girgaum Mills, Bombay.
Superintendent, Postal Workshop, Aligarh.
Messrs. Burn & Co., Calcutta.

2. Of the above, I received applications for samples only from those noted on the margin, whom I supplied with all the information required. An abstract of all the replies received from the parties who did not tender is given in the accompanying statement† It will be observed that the responses to the invitations given are not satisfactory or encouraging, and do not evince any disposition, at present at any rate, to take advantage of the Government offer. This may probably arise from the little inducement to enter on new manufactures of a special kind, the quantities of which required by Government alone, in the absence of any general demand in the country, are not likely to be sufficiently remunerative.

Messrs. Richardson and Cruddas, Bombay.
Superintendent, Canal Foundry and Workshops, Roorkee.
Messrs. Fraser and Miller, Bombay.
,, Jessop & Co., Calcutta.
Manager, Girgaum Paper Mills, Bombay.
Messrs. Burn & Co., Calcutta.
James Murray, Esq. ,,

† Enclosure B.

3. So far as tenders have been received, a statement‡ is appended of the several articles with the names of parties tendering and the prices tendered, as compared with the prices actually paid in India to contractors for similar English goods within the last two years, to which I shall briefly allude in each instance :—

‡ Enclosure C.

		Rs.	A.	P.	
4. Parallel rulers, 18″ long		10 No			
English contract rate		1	4	5	each

The following tenders have been received :—

		Rs.	A.	P.
Fraser and Miller, Bombay		2	10	0
Superintendent of Workshops, Roorkee	ebony	4	0	0
	boxwood	3	4	0
Jessop & Co., Calcutta		5	4	0

The Bombay tender is the lowest, though somewhat higher than the English rate.

5. Round rulers, ebony	20 No. 36″ by 1¼″	170 No. 30″ by 1¼″	400 No. 24″ by 1¼″	1,400 No. 18″ by 1″	1,200 No. 12″ by ¾″
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
English contract rate, 1881-82, per dozen	25 0 0	19 0 0	11 8 0	6 12 0	3 8 0
Poteetpabon Mitter and Audittya Chunder Bose, Kidderpore ... ebony, per dozen	22 0 0	22 0 0	11 0 0	6 8 0	3 4 0
Poteetpabon Mitter and Audittya Chunder Bose, Kidderpore ... sissoo wood, per dozen ...	10 0 0	9 0 0	8 0 0	5 0 0	2 12 0
Superintendent of Workshops, Roorkee, boxwood, per dozen	15 0 0	12 0 0	9 0 0	6 0 0	3 12 0
Fraser and Miller, Bombay, per dozen	......	......	......	......	6 0 0
Jessop & Co., Calcutta, per dozen	......	......	......	......	7 8 0
D. M. Traill, Calcutta, English-made, per dozen ...	24 0 0	13 12 0	9 4 0	5 8 0	2 8 0

If other wood than ebony be accepted, the sissoo wood rulers offered by P. P. Mitter and A. C. Bose of Kidderpore are the cheapest, and next to them the ebony ones they offer. From the samples, however, I am apprehensive that the workmanship is not first-rate nor equal to the English ones, and rulers that are not perfect would be universally rejected by officers to whom they might be supplied The boxwood rulers offered by the Roorkee Workshops are of a light coloured wood, which is not suitable and has a tendency to warp. The ebony ones offered by Fraser and Miller and Jessop & Co. are too dear, and in contrast to them is the tender made by D. M. Traill of Calcutta for English-made rulers, which in point of excellence and cheapness outbeat the rest. Under these circumstances, as the conditions which the Government of India have laid down for giving preference to articles of Indian manufacture are not fulfilled, and I am interdicted from procuring the excepted articles by indent on the Secretary of State, I must await instructions from Government whether in this instance the rulers of Indian or English make should be accepted.

6. Flat rulers, ebony		85 No. 24″	25 No. 18″
		Rs. A. P.	Rs. A. P.
English contract rate, 1881-82, per dozen		9 12 6	6 1 9

Tenders received.

P. P. Mitter and A. C. Bose, Kidderpore,	sissoo wood, per doz.	9 0 0	6 0 0
	ebony ,,	13 8 0	6 0 0
Fraser and Miller, Bombay	,,	....	8 4 0
Superintendent of Workshop, Roorkee, ...	,, ,,	....	10 8 0
	boxwood ,,	....	6 0 0
Jessop and Company		....	13 8 0

In this case also the English-made rulers are the best and cheapest.

7. Japanned tin-boxes for colours.

	Rs. A. P.
English contract rate, 1880-81	3 6 10 each

Tenders received.

Jessop and Company, Calcutta	5 4 0 ,,
D. M. Traill ,, English-made	3 12 0 ,,

Here also there is no reason for preferring the Indian-made articles.

8. Red tape in bundles, 7 yards in length, dozen bundles	6,000 $\frac{1}{2}$″	5,000 $\frac{1}{4}$″
	Rs. A. P.	Rs. A. P.
English contract rate, 1881-82, per dozen bundles ...	0 9 0	0 7 0

Tenders received.

R. D. Naug and Company, Calcutta	1 0 0	0 14 0
Jodunath Dutta ,, ...	0 14 0	0 10 0
R. H. Hollingbery ,, ...	0 14 0	0 11 0
D. M. Traill ,, English-made ...	0 8 6	0 6 6
P. P. Mitter and A. C. Bose, Kidderpore ...	0 8 8	0 6 11

The tenders for this article show that the native manufacture cannot yet compete with the English machine-made tape. The Indian samples are inferior both in quality and colour, and Mr. Traill's offer is decidedly the cheapest. Instructions are required for my guidance.

9. White tape, $\frac{3}{8}$″ wide	27,250 yards.
	Rs. A. P.
Rate of local purchases, 1880-81	0 12 0 per 100 yards.

Tenders received.

P. P. Mitter and A. C. Bose, Kidderpore,	English ...	0 9 9 ,, ,,
Elahi Buksh Patwar,	country ...	2 8 0 ,, ,,

The country tape, for which only one tender has been received, is coarser and much dearer than the English samples. The same remarks apply as to red tape.

10. Plain ink glasses with plated tops	1,200 dozens.
	Rs. A. P.
English contract rate, 1881-82, per dozen	1 8 0

Tenders received.

P. P. Mitter and A. C. Bose, Kidderpore, per dozen		... 1 7 8
J. N. Dutt, Calcutta ...	No. 1 ,,	... 1 8 0
	,, 2 ,,	... 1 6 0
D. M. Traill, English-made	,,	... 1 12 0

The samples submitted by the native tenderers are very inferior, and the result is that the ink glasses supplied by the contractors, Messrs. Wiggins, Teape and Company, for the present year are far better and comparatively cheaper than any of the present tenders, not excepting Mr. Traill's, which are also of English make. Further enquiries are being made in accordance with the instructions of the Government of India in letter No. 869, dated 13th ultimo.

11. Pasteboards, blue, royal size ... ... 1,200 dozens.

		Rs.	A.	P.
English contract rate, 1880-81, per gross...		8	5	0

Tenders received.

		Rs.	A.	P.
A. B. DeNegri, Calcutta, country-made ...		9	0	0
D. M. Traill, Calcutta, English-made	No. 1	10	4	0
	,, 2	11	0	0
	,, 3	11	8	0
	,, 4	13	8	0

Pasteboards, white, royal size ... ... 4,800 dozens.

		Rs.	A.	P.
English contract rate, 1880-81, per gross...		9	0	0

Tenders received.

		Rs.	A.	P.
A. B. DeNegri, country, per gross ...		9	0	0
D. M. Traill, English-made, per gross	No. 1	10	4	0
	,, 2	11	0	0
	,, 3	11	8	0
	,, 4	13	8	0

The only tender for country-made pasteboards is from a Frenchman, DeNegri, who has recently introduced the manufacture in this town on a small scale and is desirous of extending his operations. His rates are the same for white pasteboard, and 11 annas per gross more for blue pasteboard than the English contract rates in 1880-81. I would, if the Government approve, accept his tender in the hope that, if he succeeds in his attempt, he may be able to supply a cheaper article in future.

12. Strawboards, of sizes ... ... 384 cwt.

	Rs.	A.	P.	
English contract rate, 1881-82	8	4	0	per cwt.

Tenders received.

	Rs.	A.	P.	
A. B. DeNegri, country	7	4	0	,,
Ramdhone Naug and Company, Calcutta ...	8	0	0	,,
D. M. Traill, Calcutta, English-made ...	10	4	0	,,

In this article the tender of DeNegri is the lowest, and I would accept it.

13. Paper-slices, ivory ... ... 200 dozens.

	Rs.	A.	P.	
English contract rate, 1881-82	7	0	0	per dozen.

Tender received.

	Rs.	A.	P.	
D. M. Traill, English made	6	2	0	,,

I have received no tenders for country-made paper slices, though I have no doubt they ought to be procurable here. Mr. Traill's tender for English-made ones is somewhat lower than the present rate, but I await the orders of Government before acceptance.

14. Blotting paper, pink, superior quality — 37 reams:

	2 reams. 22½″ × 17½″ 40 lb.	25 reams. 32 lb.	10 reams. 16 lb.	
	Rs. A. P.	Rs. A. P.	Rs. A. P.	
English contract rate, 1881-82 ...	23 0 0	10 4 9	6 15 2	per ream.
Tender received.				
D. M. Traill, English-made ...	22 8 0	18 0 0	8 4 0	

Blotting paper, white ... ... — 36½ reams:

	3½ reams. 40 lb	33 reams. 32 lb.	
	Rs. A. P.	Rs. A. P.	
English contract rate, 1881-82	19 8 0	18 1 0	per ream.
Tender received.			
D. M. Traill, English-made	20 0 0	20 0 0	

Only a single tender for English blotting paper has been received. The quantity required being very small and of the very best quality, it is hardly to be expected that the Indian paper mills will care to compete. The Bally Mills Company, which supplies all the ordinary blotting paper, has declined to undertake the present order. The rate Mr. Traill asks is slightly above the English contract rate for the current year.

15. Brass note-book clasps	2,000 No.	
	Rs. A. P.	
English contract rate, 1881-82...	1 13 9	per 100.
Tenders received.		
Jodu Nauth Dutt, Bhowanipore	9 0 0	,,
Superintendent of Workshops, Roorkee	7 13 0	,,
D. M. Traill, English-made	2 1 3	,,

Here it seems hopeless for the country hand-made clasps to stand against the English machine-cut articles which are turned out by the million with perfect regularity of pattern and cheapness of execution. Even the Roorkee samples, which are better and cheaper than the native-made, are about three times dearer than those at present obtained from England.

16. Scissors	100 dozens large.	60 dozens small.
	Rs.	Rs. A. P.
English contract rate, 1881-82, per dozen ...	13	6 8 0
Tender received.		
Superintendent of Postal Workshops, Roorkee ...	12	6 0 0

17. Erasers	1,200 No.
	Rs. A. P.
English contract rate, 1881-82, per dozen	6 4 0
Tender received	
Superintendent of Workshops, Roorkee	4 8 0

The only tender for scissors and erasers, received from the Roorkee Workshops has since been recalled by the Superintendent, who states "they cannot be manufactured here, as I have heavy departmental work on hand for the present."

	Slabs.		Saucers.	
18. Colour-slabs and saucers	250 3 nests.	150 6 nests.	700	
	Rs. A. P.	Rs. A. P.	Rs. A. P.	
English contract rate, 1881-82 ...	0 3 1½	0 7 6½	0 0 7½	each.
Tender received.				
Burn and Company, Raneegunge Pottery	0 3 4	0 8 0	0 0 8	,,

The rates of Messrs. Burn and Company are a trifle higher than the English rates, but the tender may with the approval of Government be accepted.

19. The above constitute all the tenders that have been received. It will be observed that with respect only to the items noted on the margin have satisfactory offers of country articles been received. As regards the rest, for which either no country articles have been offered, or no tenders at all have been received, I would solicit orders whether I am to submit a supplementary indent to be forwarded to the Secretary of State, or whether I am to endeavour to obtain the articles here, as the total value of them is not large at prices not above those hitherto paid, which I may remark generally have not been excessive. The time will scarcely admit of an indent being sent to England for compliance, unless more than ordinary expedition be used in sending out the goods, but I shall readily carry out any instructions the Government may think proper to issue.

Pasteboards, blue.
Ditto, white.
Strawboards.
Colour-slabs.
Do., saucers.

20. As regards the supplies of similar articles for 1883-84, and for the future, it is possible that as the intentions of Government become more widely known, and as fresh industries arise, some of the articles may be competed for, and I shall endeavour to publish the advertisements for tenders at an earlier period; but as the demands of Government in this department are in most cases limited, it is not easy to offer sufficient encouragement for new enterprises which require machinery and capital, and must therefore depend upon the general development and requirements of the country.

A

GOVERNMENT STATIONERY OFFICE.

4, CHURCH LANE.

The 20th September 1881.

NOTICE.

SEALED tenders for the supply of the undermentioned articles of country manufacture, according to samples which may be seen on application at this office, will be received by the undersigned up to 1st December next.

The articles are to be delivered within the month of April next. The parties whose tenders may be accepted will be required to deposit as security 10 per cent of the value of the articles, and to sign a contract agreement.

Parallel rulers, 18″ long	10 No.
Japanned tin-boxes for colours	65 „
Red tape, cotton, ½″ wide, 7 yards long	6,000 dozen bundles.
Ditto, ¼″ wide, 7 „ „	5,000 „ „
Round rolers, 36″ long, 1½″ diameter	20 No.
Ditto 30″ „ 1¼″ „	170 „
Ditto 24″ „ 1⅛″ „	400 „
Ditto 18″ „ 1″ „	1,400 „
Ditto 12″ „ ⅞″ „	1,200 „
Flat rulers, 24″ „	85 „
Ditto 18″ „	25 „
Plain ink glasses, with plated tops	1,200 dozens.
Pasteboards, blue, royal, 4 sheets, 25″ by 20″	1,200 „ pieces.
Ditto, white, ditto	4,800 „ „
Strawboards, super-royal, 2½lbs. each	24 cwt.
Ditto, 30″ by 20″	210 „
Ditto, royal, 27″ by 22″	57 „
Ditto, demy, 24½″ by 19½″	51 „
Ditto, foolscap, 18¾″ by 15¾″	42 „
Slices or paper-cutters, ivory 7½″	200 dozens.
Ivory penholders	48 No.
Envelope stands of fancy wood, with 8 compartments of sizes, length 15″, breadth 6″, height 10″ approximately	6 „
Pink blotting paper, 22½″ by 17½″ (very best quality), 40lbs.	2 reams.
Ditto ditto ditto ditto 32 „	25 „
Ditto ditto ditto ditto 16 „	10 „
White blotting, thick imperial	12 quires.
Ditto 22½″ × 17½″ (very best quality), 40lbs.	3½ reams.
Ditto 22½″ by 17½″ ditto 32 „	33 „
White tape (cotton) ⅜″ wide	27,250 yards.
Brass note-book clasps, 2″ by ¾″	1,000 No.
Ditto ditto 1½″ × ⅝″	1,000 „

W. H. RYLAND,
Officiating Superintendent.

B.

Abstract Statement of replies to call for tenders.

Names.	Date of reply.	Abstract.
Agent, Elgin Mills Company, Cawnpore.	Dated 14th November 1881	None of the articles enumerated in list of Government stationery are comprised among the Company's manufacture.
Ditto ditto	Dated 2nd January 1882	No broadcloth like sample can be had.
Ditto ditto	Dated 22nd November 1881	The Company do not manufacture tape as per sample forwarded to them.
Manockjee Petit Manufacturing Company, Limited, Bombay.	Dated 28th November 1881	They do not manufacture any of the articles named in the advertisement.
Agents, Bally Paper Mills Company, Limited, Calcutta.	Dated 29th November 1881	They cannot supply any of the articles enumerated in the advertisement.
Manager, Girgaum Paper Mills, Bombay.	Dated 13th December 1881	The mill is not for the present prepared to supply any of the sorts of paper required by the Stationery Office.
James Murray, Hastings street	Dated 26th January 1882	He is unable this year to tender for flat and round rulers for want of suitable wood.
Secretary, Bombay Mill-owners Association.	Dated 30th January 1882	They do not know if any mill in Bombay can make tape similar to sample.

C

ARTICLES.	Quantity required.	English contract rate.	Names of tenderers.	Rates tendered.	REMARKS
1	2	3	4	5	6
		Rs. A. P.		Rs. A. P.	
Parallel rulers, 18"	10 No. ...	1 4 5 each	Fraser and Miller, Carnac Iron Works, Bombay.	2 10 0 each.	
Ditto, 18" ebony			Superintendent, Canal Foundry and Workshops, Roorkee.	4 0 0 ,, 3 4 0 ,,	
Ditto, 18" box-wood					
Round rulers, 36" long, 1¼" diameter	20 ,, ...	25 0 0 doz. ebony.	D. M. Traill, Calcutta	24 0 0 dozen.	
Ditto, 36" ,, 1¼" ,, imitation ebony and sissoo wood.			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	10 0 0 ,,	
Ditto, 36" ,, 1¼" ,, real black ebony ...			Ditto ditto. ...	22 0 0 ,,	
Ditto, 36" ,, 1¼" ,, box-wood			Superintendent, Canal Foundry and Workshops, Roorkee.	1 4 0 each. 15 0 0 dozen.	
Ditto, 30" ,, 1¼" ,, ...	170 ,, ...	19 0 0 ,,	D. M. Traill, Calcutta	13 12 0 ,,	
Ditto, 30" ,, 1¼" ,, imitation ebony and sissoo wood.			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	9 0 0 ,,	
Ditto, 30" ,, 1¼" ,, real ebony ...			Ditto ditto. ...	22 0 0 ,,	
Ditto, 30" ,, 1¼" ,, box-wood			Superintendent, Canal Foundry and Workshops, Roorkee.	1 0 0 each. 12 0 0 dozen.	
Ditto, 24" ,, 1⅛" ,, ...	400 ,, ...	11 8 0 ,,	D. M. Traill, Calcutta	9 4 0 ,,	
Ditto, 24" ,, 1⅛" ,, imitation ebony and sissoo wood.			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	8 0 0 ,,	
Ditto, 24" ,, 1⅛" ,, real ebony ...			Ditto ditto ...	11 0 0 ,,	
Ditto, 24" ,, 1⅛" ,, box-wood			Superintendent, Canal Foundry and Workshops, Roorkee.	0 12 0 each. 9 0 0 dozen.	
Ditto, 18" ,, 1" ,, ...	1,400 ,, ...	6 12 0 ,,	D. M. Traill, Calcutta	5 8 0 ,,	
Ditto, 18" ,, 1" ,, imitation ebony and sissoo wood.			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	5 0 0 ,,	
Ditto, 18" ,, 1" ,, real ebony ...			Ditto ditto ...	6 8 0 ,,	
Ditto, 18" ,, 1" ,, boxwood			Superintendent, Canal Foundry and Workshops, Roorkee.	0 8 0 each. 6 0 0 dozen.	
Ditto, 12" ,, ¾" ,, ...	1,200 ,, ...	3 8 0 ,,	D. M. Traill, Calcutta	2 8 0 ,,	
Round black ruler, 12" long			Fraser and Miller, Carnac Iron Works, Bombay.	0 8 0 each. 6 0 0 dozen.	
Round ruler, 12" long, ¾" diameter, imitation ebony and sissoo wood.			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	2 12 0 ,,	
			Ditto ditto ...	3 4 0 ,,	
Ditto, 12" ,, ¾" ,, real ebony			Superintendent, Canal Foundry and Workshops, Roorkee.	0 5 0 each. 3 12 0 dozen.	
Ditto, 12" ,, ¾" ,, box-wood			Joseph & Co., Calcutta ...	0 10 0 each. 7 8 0 dozen.	
Ditto, 12" ,, ¾" ,, as per muster furnished ...					
Flat rulers, 24", imitation ebony and sissoo wood ...	85 ,, ..	9 12 6 ,,	Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	9 0 0 ,,	
Ditto, 24", real ebony			Ditto ditto.	13 8 0 ,,	
Ditto, 18"	25 ,, ...	6 1 9 ,,	Fraser and Miller, Carnac Iron Works, Bombay.	0 11 0 each. 8 4 0 dozen.	
Ditto, 18", imitation ebony and sissoo wood ...			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	6 0 0 ,,	
Ditto, 18", real ebony			Ditto ditto.	6 0 0 ,,	
Ditto 18" ebony			Superintendent, Canal Foundry and Workshops, Roorkee.	0 14 0 each. 10 8 0 dozen.	
Ditto, 18" box-wood			Ditto ditto ...	0 8 0 each. 6 0 0 dozen.	
Ditto, 18" as per muster furnished			Joseph & Co., Calcutta	1 2 0 each. 13 8 0 dozen.	
Japanned tin-boxes for colours	65 ,, ...	3 6 10 each, rate of 1880-81.	D. M. Traill, Calcutta	3 12 0 each.	
Ditto ditto as per muster furnished by the Stationary Office.			Joseph & Co., Calcutta ...	5 4 0 ,,	
Red tape, cotton, ½" wide 7 yards long	6,000 doz. bdls.	0 9 0 doz. bundles	D. M. Traill, Calcutta	0 8 6 dozen.	
Ditto, ½" ,, 7 ,, ...			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	0 8 8 ,,	
Ditto, ½" ,, 7 ,, ...			Ramdhone Nag & Co., Calcutta ...	1 0 0 ,,	
Ditto, ½" ,, 7 ,, ...			Juddo Nauth Dutt, Calcutta ...	0 14 0 ,,	
Ditto, ½" ,, 7 ,, ...			R. H. Hollingbery ,, ...	0 14 0 ,,	
Ditto, ¾" ,, 7 ,, ...	5,000 ,, ...	0 7 0 ,,	D. M. Traill ,, ...	0 6 6 ,,	
Ditto, ¾" ,, 7 ,, ...			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	0 6 11 ,,	
Ditto, ¾" ,, 7 ,, ...			Ramdhone Nag & Co., Calcutta ...	0 14 0 ,,	
Ditto, ¾" ,, 7 ,, ...			Juddoo Nath Dutt, Calcutta ...	0 10 0 ,,	
Ditto, ¾" ,, 7 ,, ...			R. H. Hollingbery, ,, ...	0 11 0 ,,	
White tape (cotton), ½" wide	27,250 yds. ...	0 12 0 per 100 yds., rate of local purchase, 1880-81.	Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore,	0 9 9 per 100 yds.	
Ditto, ⅝" ,, ...			Alahi Bux, Patwar	2 8 0 ,,	
Ditto, ¾" ,, ...			D. M. Traill, Calcutta	0 1 0 per yd. 6 4 0 per 100 yds.	
Plain ink glasses, with plated tops	1,200 dozs. ...	1 8 0 doz.	D. M. Traill ,, ...	1 12 0 dozen.	
Ditto, ditto			Potteetpabun Mittra and Audittya Chundra Bose, Kidderpore.	1 7 8 ,,	
Glass inkstand with cover, No. 1			Juddo Nauth Dutt, Calcutta ...	1 8 0 ,,	
Ditto, ditto ,, 2			Ditto ditto ...	1 6 0 ,,	

ARTICLES.	Quantity required.	English contract rate.	Name of tenderers.	Rates tendered.	REMARKS.
1	2	3	4	5	6
		Rs. A. P.		Rs. A. P.	
Pasteboard, blue, royal, 4 sheets, 25″ by 20″	1,200 doz.	0 11 1 doz. 8 5 0 gross. rate of 1880-81.	D. M. Traill, Calcutta... ...	10 4 0 gross.	
Ditto, ditto, No. 2			Ditto	13 8 0 ,,	
Ditto, ditto, ,, 3			Ditto	11 8 0 ,,	
Ditto, ditto, ,, 4			Ditto	11 0 0 ,,	
Ditto, ditto			A. B. DeNegri	9 0 0 ,,	
Pasteboard, white, royal, 4 sheets, 25″ by 20″	4,800 ,,	0 12 0 doz. 9 0 0 gross.	D. M. Traill, Calcutta	10 4 0 ,,	
Ditto, ditto, No. 2			Ditto	13 8 0 ,,	
Ditto, ditto, ,, 3			Ditto	11 8 0 ,,	
Ditto, ditto, ,, 4			Ditto	11 0 0 ,,	
Ditto, ditto			A. B. DeNegri	9 0 0 ,,	
Strawboards of sizes, marks H B and H H	380 cwt.	8 4 0 cwt.	D. M. Traill, Calcutta	10 4 0 cwt.	
			Ramdhone Nag and Co., Calcutta	8 0 0 ,,	
			A. B. DeNegri	7 4 0 ,,	
Slices or paper-cutters, ivory, 7½″	200 dozen	7 0 0 doz.	D. M. Traill, Calcutta	6 2 0 dozen.	
Pink blotting, 22½″ by 17½″ (very best quality), 40 lbs. No. 1	2 reams	23 0 0 ream	Ditto	20 4 0 ream.	
Ditto, 22½″ by 17½″ ditto, 40 ,, L 1 ...			Ditto	22 8 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, No. 2			Ditto	16 4 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, L 2 ...			Ditto	17 8 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, No. 3			Ditto	15 12 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, ,, 960			Ditto	16 4 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, ,, 1	25 ,,	10 4 9 ream rate of 1873-74.	Ditto	16 10 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, L 1 ...			Ditto	18 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, No. 2			Ditto	13 8 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, L 2 ...			Ditto	14 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, No. 3			Ditto	12 6 0 ,,	
Ditto, 22½″ by 17½″ ditto, 32 ,, ,, 960			Ditto	13 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 16 ,, ,, 1	10 ,,	6 15 2 ream, ordinary	Ditto	8 4 0 ream.	
Ditto, 22½″ by 17½″ ditto, 16 ,, L 1 ...			Ditto	9 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 16 ,, No. 2			Ditto	7 2 0 ,,	
Ditto, 22½″ by 17½″ ditto, 16 ,, L 2 ...			Ditto	7 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 16 ,, No. 3			Ditto	6 6 0 ,,	
Ditto, 22½″ by 17½″ ditto, 16 ,, ,, 900			Ditto	6 8 0 ,,	
White, blotting, 22½″ by 17½″ ditto, 40 ,, L 1 ...	3 ,,	19 8 0 ream	Ditto	20 0 0 ream for 38 lbs.	
Ditto, 22½″ by 17½″ ditto, 40 ,, L 2 ...			Ditto	15 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, No. 900			Ditto	17 8 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, ,, 63...			Ditto	15 12 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, ,, 42...			Ditto	18 8 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, L 1 ...	33 ,,	18 1 0 ,,	Ditto	20 0 0 ream for 30 lbs.	
Ditto, 22½″ by 17½″ ditto, 40 ,, L 2 ...			Ditto	15 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, No. 960			Ditto	17 0 0 ,,	
Ditto, 22½″ by 17½″ ditto, 40 ,, ,, 42			Ditto	14 10 0 ,, 7 12 0 ream for 16lbs.	
Brass note-book, clasps 2″ by ¾″ as per sample ... No. 1 ...	2,000 No.	1 13 9 per 100	Judoo Nath Dutt, Bhowanipore...	9 0 0 per 100.	
Ditto ditto ...			Superintendent, Canal Foundry and Workshops, Roorkee.	7 13 0 ,,	
Ditto ditto ...			D. M. Traill, Calcutta ...	2 1 3 ,,	
Scissors, large	100 doz.	13 0 0 dozen	Superintendent of Postal Workshops, Aligarh.	1 0 0 each. 12 0 0 dozen.	The Superintendent in his letter No. 687, dated 28th February 1882, says that "they cannot be manufactured here, as I have heavy departmental work on hand for the present."
Do., small	60 ,,	6 8 0 ,,	Ditto ditto ...	1 0 0 each. 12 0 0 dozen.	
Erasers	1,200 No.	6 4 0 ,, rate of 1880-81.	Ditto ditto ...	0 6 0 each. 4 0 0 dozen.	
Colour-slabs with 3 nests	250 ,,	0 3 1½ each	Messrs. Burn & Co., Calcutta ...	0 3 4 each.	
Ditto 6 ,, ...	150 ,,	0 7 6½ ,,	Ditto ditto ...	0 8 0 ,,	
Saucers	700 ,,	0 0 7½ ,,	Ditto ditto ...	0 0 8 ,,	

W. H. RYLAND,
Officiating Superintendent.

The 10*th March* 1882.

No. 1166, dated 29th August 1882.

From—C. S. BAYLEY, ESQ., Offg. Under-Secy. to Govt. of Bengal, General Dept.,
To—The Officiating Superintendent of Stationery, Calcutta.

I AM directed to acknowledge the receipt of your letter No 5897, dated the 10th March 1882, with enclosures, in which you report the result of the enquiries made by you as to the possibility of substituting articles of stationery of local manufacture for similar articles obtained from England.

2. It appears that, in reply to your call, tenders have been made by different firms and private individuals for the supply of the articles noted on the margin, regarding the purchase of which I am now to communicate to you the following orders.

Parallel rulers.
Round rulers.
Flat rulers.
Japanned tin-boxes for colours.
Red tanpe.
White tape
Plain ink glasses with plated tapes.
Pasteboards, blue.
  Ditto white.
Strawboards.
Paper slices.
Blotting paper, pink.
  Ditto white.
Brass note-book clasps.
Scissors.
Erasers.
Colour-slabs and saucers.

Parallel rulers.—The lowest tender for these articles is that made by Messrs. Fraser and Co. of Bombay, who are willing to supply them at Rs. 2-10. As this is far above the English contract rate of Rs. 1-4-5, these rulers must for the present continue to be procured from England.

Round rulers.—The English contract rate varies according to the size of the rulers from Rs. 25 to Rs. 3-8 a dozen. Tenders have been received from the Roorkee Workshop and from three private firms for the manufacture of these rulers at prices generally below the English rates; but you report that the workmanship is not first rate, or, except in the case of the rulers made at the Roorkee Workshop, such as would be accepted by the officers to whom rulers are supplied. The Roorkee rulers, however, are of box-wood, which has a tendency to warp. Under these circumstances you should for the present obtain round rulers from England, but you should ascertain whether the manufacturers are not in a position to improve upon the specimens shewn to you. Messrs. Traill and Co.'s tender for English-made rulers cannot, under the orders of the Government of India, be accepted.

Flat rulers.—None of the specimens for which tenders have been made are as good or as cheap as the rulers procured from England. The tenders must therefore be rejected.

Japanned tin-boxes for colours.—One tender only has been received for native-made colour boxes. The price at which they are offered is Rs. 5-4, which is nearly Rs. 2 higher than the English contract rate—Rs. 3-6-10. These boxes must still be produced from England.

Red and white tape.—The tape of native manufacture, for which tenders have been received, is, you report, far inferior to that procured from England; and no change can therefore be made in the mode of purchase for the present.

Ink glasses.—The Lieutenant-Governor will await a report as to the result of the further enquiries which you are making as to these articles. In the mean time, as those produced by the tenderers are of inferior manufacture, ink glasses must be procured from England.

Pasteboards and strawboards.—You have already been authorized to enter into a contract with Mr. DeNegri of Calcutta for the purchase of these articles.

Paper slices and blotting paper.—The only tender made being for paper slices and blotting paper of English manufacture cannot be accepted. It is a matter for regret that the Bally Mills, which supply the cheaper kinds of blotting paper, should have been unable to undertake the manufacture of the quantities of superior blotting paper required.

Brass note book clasps.—The best tender for these articles of native manufacture was that received from the Roorkee Workshop, but the clasps are of inferior manufacture and very much dearer than those procured from England. No change can be made in the method of procuring these clasps.

Scissors and erasers.—These must still be procured from England, as the Superintendent of the Roorkee Workshop, who submitted the only tenders, has since withdrawn them owing to press of departmental work. You should, however, ascertain whether it is possible to procure these articles from Roorkee in future.

Colour-slabs and saucers.—The tender submitted by Messrs. Burn and Co. for the supply of these articles is little higher than the contract rate, and should therefore be accepted.

3. The Lieutenant-Governor regrets that more offers from Indian manufacturers have not been forthcoming, but he trusts that in future years it may be possible to extend the number of articles of stationery which it is possible to procure in this country, and you should take every opportunity of doing this. In the meantime, however, you should submit at once a supplementary indent for such of the above articles as are now required. Should it be impossible in any case to wait for the receipt of supplies from England, you are authorized to make purchases locally, but this discretion should be used as sparingly as possible.

4. Orders have been issued to all indenting officers subordinate to this Government to communicate to you any instance in which they consider that they can procure articles in the local market cheaper or of better quality than those procured through your office, with a view to your making the necessary enquiries on the subject. It will probably be expedient that all purchases should ultimately be made by you

---

No. 1167.

Copy, with copy of the letter to which this is a reply, forwarded to the Financial Department of this office for information, with reference to Mr. Baker's endorsement No. 957TF, dated the 14th July 1882.

No. 3872, dated 19th June 1882.

From—A. W. CROFT, ESQ., M.A., Director of Public Instruction, Bengal,
To—The Secretary to the Government of Bengal, General Department.

I HAVE the honour to submit the report called for in your Circular No. 39, dated 1st December 1881, as to the cheapest way of substituting goods of Indian manufacture for articles now obtained from England.

2. The articles in general use by this Department are—

(1) Stationery.
(2) Books
(3) Furniture
(4) Chemicals.
(5) Scientific apparatus.

(1) *Stationery.*—This is obtained either by indent on the Superintendent of Stationery or in the local market. The first head need not be here considered, as the necessary enquiries have doubtless been made by the Superintendent, who will continue to supply the requirements of this department. With regard to the second head, purchases of which are made from a budget allowance for "Country stationery," the separate colleges and schools already procure in the local market what they need. The articles purchased under this head vary in different localities. For instance, though blotting paper, brown paper, rough paper, twine, gum, inkstands, and scales are articles of local manufacture at Cuttack, and therefore rightly purchased from the allowance for country stationery, yet at Rajshahye or Patna, where there is no such local manufacture, the same articles are procured from the Superintendent of Stationery.

(2) *Books* (other than those published in this country) are purchased either from Messrs. Brown & Co. under the existing contract with the Government, or from the Calcutta School Books Society by a special arrangment for the Education Department.

(3) *Furniture* is always procured of local manufacture.

(4) *Chemicals* are procured, whenever possible, from Messrs. Waldie & Co. of Cossipore under recent orders of Government. Those not procurable from Messrs. Waldi & Co. are obtained by indent on the Secretary of State through the Store Department. In this connection, however, I beg to submit copy of a letter from Mr. A. Pedler, Professor of Chemistry in the Presidency College, on the comparative advantages of procuring chemicals locally and from England.

(5) *Scientific apparatus* is in all cases procured from England through the Store Department of the India Office. The process is a tedious one and involves very great delay; but proposals to adopt a more expeditious and equally cheap method of procuring such articles have not received the sanction of Government.

3. With regard to articles of miscellaneous use, there is necessarily no fixed rule. Padlocks are manufactured at one place; purdahs, towels, and table-cloths at another; scissors at a third. Where such articles are manufactured locally, they are already in local use; where they are not manufactured locally, they are procured, whether of English or of Indian manufacture, from the local shopkeepers; and the quality and price together determine in each case which shall be purchased. But no miscellaneous articles of this class are procured directly from England by the Education Department.

Dated 7th February 1882.

From—A. PEDLER, ESQ., Professor of Chemistry, Presidency College,
To—The Principal, Presidency College.

WITH reference to Circular No. 70 from the Director of Public Instruction, I have the honour to state that it has been the practice for some years at the Presidency College to obtain certain chemicals, stores, &c., for the use of the chemical laboratory. The list of such articles will be found in the various petty expenditure bills which have been sent in from time to time.

Most of the chemicals and chemical apparatus required for the use of the laboratory have, however, always been indented for from England for two or three reasons. First, much of the apparatus and a considerable proportion of the chemicals required cannot be obtained in the local market at all; secondly, the articles procured from England direct are usually in better condition or of better quality than those locally obtainable; and thirdly, the cost of articles procured by indent is rarely more than one-half that of articles purchased from the majority of local suppliers. With regard to this last point, I have carefully compared the cost of certain articles obtained from England with the price as quoted by a wholesale chemist in Calcutta, and have found that the English price was little more than one-half the Indian price.

In the list given in the Circular, I find in some instances that the prices paid for chemicals are three and four times as much as they could be obtained for from England; and if thought necessary, I could submit a list of the comparative prices. It would therefore, in my opinion, be far more expensive to buy all the chemicals, &c., required for the Presidency College in the local market than, as at present, by indent; and I am also of opinion that there would be no falling off in the quality of articles obtained.

No. 1168, dated 29th August 1882.

From—C. S. BAYLEY, ESQ., Offg. Under-Secy. to the Govt. of Bengal, General Dept.,
To—The Director of Public Instruction, Bengal.

I AM directed to acknowledge the receipt of your letter No 3872, dated the 19th June 1882, with enclosure, and in reply to say that you should continue to purchase locally the furniture required by you. Such scientific apparatus as cannot be procured of Indian manufacture must for the present be procured from England through the Store Department of the India Office; but the Lieutenant-Governor trusts that you will use every effort to employ articles of local manufacture as far as possible.

No. 467B, dated 6th June 1882.

From—A. FORBES, ESQ., Secretary to the Board of Revenue, Lower Provinces,
To—The Secretary to the Government of Bengal, General Department.

I AM directed to submit the following reply to Government Circular No. 39, dated 1st December last, calling for a report, after the necessary enquiries, regarding the cheapest and most convenient way of obtaining in future regular supplies of goods of Indian manufacture required by officers subordinate to the Board.

Canvas, twine for sewing canvas, kerosine and linseed oil, iron padlocks, rope, iron and brass hinges, iron chains, &c.

2. The Opium Agent of Behar states that very few of the articles enumerated in the list annexd to the Government circular under reply as of Indian manufacture have any reference to his requirements, and that the quantities required in his department of the articles marginally noted are so small that it would be scarcely worth while to make a contract for the supply of them for a term of years. He further explains that the canvas required is used for covering the fire-engine hose, and must be of the best English quality; and with reference to kerosine oil, he strongly recommends that in order to avoid risk from fire, the best American oil be still purchased in Calcutta. The Board would give their support to these two proposals. As regards hammers, the Agent states that steel-faced ones are required both for smiths, rivetters, and carpenters, and that those locally manufactured are not steel-faced, but only case-hardened, and therefore neither durable nor effective. The Agent has, however, been informed that the orders of Government on this point should be carried out, and he has been instructed to make further endeavours to obtain locally made hammers of a suitable quality, reporting the result to the Board. As regards linseed oil, instructions have already been issued to the Agent that the article should be obtained from the Ghazipur Jail, where the Board have ascertained that it can be procured of excellent quality. The Agent reports that padlocks of Indian manufacture are inferior in point of strength and workmanship, and unsuited to the requirements of the Opium Department. On this subject the Principal Assistant, Dr. Sheppard, remarks—

> PARA. 7 * * * * As we use padlocks to secure our storing houses at night, one of which contains over 1½ millions sterling of moveable property in the form of opium cakes, a bad padlock is useless. Further, we require padlocks made different for each building, and in sets, so that one key will open all. I doubt if such could be obtained in India.
>
> Any one who has witnessed the delay on opening the locks of a godown at night, when each padlock has to be opened by a different key, even by a native turnkey of experience, will be aware of the danger run when such a cause of excitement as the outbreak of fire deprives the natives of such little presence of mind as they possess, and renders them useless.
>
> My opinion is it would be next to impossible to get the godown doors open, and get at a fire, were each lock different and a separate key needed. * * * *

The Board, however, have informed the Agent that they consider that the wishes of Government should be carried out in this particular also, and he has been informed of the result of the enquiries which have been made by the Opium Agent of Benares regarding padlocks, as mentioned in paragraph 3 of this report, with the request that he will make any further enquiries from Messrs. Marillier and Edwards on the subject that he may consider necessary. The Agent also expressed an opinion that the pitch supplied should be of European make. The Board accordingly made enquiries in this matter from the Oriental Gas Company, Messrs. Ahmuty and Co., and elsewhere. The result was to show that, although coal-pitch used to be prepared by the Oriental Gas Company, its manufacture has been discontinued, and that it cannot now be obtained in this country. The native contractor who supplies the Patna Opium Factory has also informed the Board that he obtains his supplies from England. The Benares Agent has since reported to the same effect.

3. The Opium Agent of Benares observes that the articles referred to in the list forwarded with the Government circular, and which are required in the Opium Factory at Ghazipur, may be divided into the following heads:—

(1) Chemicals—
    Nitric acid, hydrochloric acid, sulphuric acid (in bottles), iodine, spirits of wine, sal-ammoniac, and potash caustic. All these are obtained by direct indent on the Medical Store-keeper at Calcutta, and the acids, &c., are presumed to be of Indian manufacture.

(2) Country stationery, including—
    Country paper, ink and pens, and common pencils and pins.
    These, when required, are purchased in the bazar.

(3) Ironware, including—
    Padlocks, &c.

The Agent has reported that he addressed five firms and establishments, and asked them to state the rates at which they would be willing to supply the factory, for a term of five years, with the articles required; and that, of the offers received Messrs. Marillier and Edwards' rates are, as will be seen from the table in the margin, the most reasonable and cheapest. The Superintendent of the Roorkee Workshops reported that he was unable to tender for the supply of any of the articles required. The Superintendent of the Postal Workshops at Aligarh tendered for only brass locks as shown in the marginal statement, and added that an addition of 15 per cent. on the price noted is chargeable on articles supplied to departments other than the Postal Department. The Agent has been asked to state where he has hitherto obtained the articles shown in the statement, and at what prices. On receipt of his reply, orders will be passed by the Board regarding accepting Messrs. Marillier and Edwards' tender.

NAMES OF FIRMS.	Iron padlocks, like Chubbs'.	Double block tin sheet.	Single tin sheet.	Twine, English.	Brass locks for drawers and boxes.	Leather, English.
				Per lb.	Each.	Per lb.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Messrs. Ahmuty & Co., Calcutta	......	0 12 0	0 6 0	0 12 0	1 8 0	1 12 0
" Marillier & Edwards, Calcutta	1 4 0	0 5 0	0 1 6	0 12 6	1 6 0	1 10 0
" T. E. Thompson & Co., Calcutta	1 8 0	0 5 9	0 1 9	......	2 0 0	2 0 0
Superintendent, Government Workshops, Roorkee ...	Cannot tender.					
Superintendent, Postal Workshops, Aligarh	......	......	......	......	1 10 6	......

(4) Cotton articles—

Kharua cloth, dammer cloth, cotton rope, and cotton wick

With the exception of the dammer cloth, which is obtained from the Cawnpore mills these articles are purchased in the local bazar. For twine of country manufacture, which is required in large quantities, tenders are usually invited.

(5) Oils—

Castor oil, mustard oil, linseed oil, poppy oil, and common oil.

Castor oil is obtained by purchase from the bazar at the ruling rates; the other oils have usually been supplied by the Ghazipur Jail.

4. The Collector of Customs at Calcutta has submitted a statement, a copy of which is enclosed, showing in detail the articles in use in the Calcutta Custom House, together with information whether the articles procured are of Indian manufacture or not, and where it is proposed to procure them in future. The Collector of Customs has been instructed by the Board to obtain the articles (A) marginally noted in the bazar, as proposed by him; and that for any of these articles for which his requirements are considerable or constant, he can call for tenders from bazar dealers The articles (B) next noted in the margin the Collector must continue, the Board think, to obtain from the Marine Department, as he now does.

(A) 1. Almirah.
5. Brooms.
6. Baskets for waste paper.
10. Chalk.
11. Cloth, coarse, for dusters.
12. Cocoanut oil.
13. Chairs.
14. Candles.
22. Desks.
28. File strings.
33. Gunny-bags (small).
34. Gurrah cloth.
46. Leather.
47. Lamp oil.
52. Mats.
63. Paste.
71. Record stand.
76. Scales, large, for weighing salt and rice.
79. Soap, Dacca.
80. Sujeemuttee.
84. Twine.
85. Table.

(B) 9. Bholeos.
15. Coal.
17 Clock.
29. Flags (ensign).
50. Life-buoy.
68. Pansway.
81. Steam-launches.

5. The articles (C) are at present obtained by the Collector of Customs from the Superintendent of Stationery. It is observed that the Collector of Customs now proposes to supply himself with several of them (marked with an asterisk) from the bazar. As, however, the Superintendent is the authorized medium through whom Government officers are supplied with the articles referred to, it will probably be advisable for the Collector to continue to draw his supplies from the Superintendent, and it will be the duty of the Superintendent to obtain the articles of Indian manufacture on the most favourable terms possible in this country. The Board are of opinion that the best plan will be for the Collector to arrange this matter in correspondence with the Superintendent, mentioning, for the Superintendent's information, the prices at which he can now supply himself from the bazar. If the Superintendent agrees that it will be for the convenience of his own and the Collector's office that the latter should obtain any of the articles in question otherwise than through his agency, the Board have no

(C) 4. Blank books of sizes.
27. Envelopes of sizes.
30. Goose quills.
*31. Glass inkpots.
*32. Gum Arabic.
39. Hones.
42. Ink, black and red.
*43. Inkstands (wooden).
44. India rubber.
51. Mill boards.
53. Needles.
56. Paper—
  Bally, royal, double foolscap.
  Blotting.
  Cartridge, white and blue.
  Double foolscap.
  Foolscap.
  Foolscap English printing.
  Marble.
  Note.
  Brown.
57. Penknives.
58. Paste boards.
*59. Paper weights.
*60. Paper-cutters.
*61. Pen-holders.
62. Pencils (soft).
  (middling).
  (coloured).
64. Pins.
*69. Rulers.
*70. Red tape.
*73. Scissors (large).
  (small).
*74. Sealing-wax.
*75. Steel pens (medium).
  (broad).
  (Magnum Bonum).
*83. Thread, silk.
92. Wafers.
*93. Waxcloth.

objection to this being done, provided that the Collector can obtain as good and cheap supplies in this way as through the Superintendent.

6. The Collector of Customs also proposes to obtain the articles (D) from Messrs. Ahmuty and Co. or Messrs. Harton and Co. He has hitherto been supplied with them by the Marine Department. The Board have instructed the Collector to consider the remarks in the preceding paragraph of this letter *mutatis mutandis*, applicable to such of these articles as are of Indian manufacture, and he has been informed that he should continue to obtain such of them as are of English manufacture (and for which Indian articles cannot be substituted) through the Marine Department. Similar orders have been issued to the Collector regarding the few articles (E) which he proposes in future to obtain from the bazar.

(D) 2. Awnings.
3. Anchors.
7. Buckets.
8. Boat hooks.
16. Chains.
18. Cooking knives.
19. Coir, yarn.
20. Cotton, waste.
23. Dungaree for dusters.
24. Dosootee cloth.
25. Deckchees.
40. Hide.
45. Jute.
49. Lamps.
55. Oars.
66. Paint.
67. Paint brushes.
72. Rope.
78. Scrubbing brushes.

(E) 54. Oil.
77. Scales, very small.
86. Twine, ball.
87. Twine, sewing.
88. Twine, sewing palm.
89. Thallies.
90. Thread, cotton.
91. Varnish.
95. Weighing machines.

7. As regards the articles numbered 48 and 65, the Collector has been recommended to communicate with Messrs Marillier and Edwards, who, the Board are informed, are prepared to supply locks and padlocks of superior make on the most reasonable terms obtainable in this country. He has been desired to ascertain whether this is the case, and to submit a further report for the Board's orders. The Board have also requested the Collector to state why the articles numbered 37 cannot be had of Indian manufacture.

48. Locks and keys.
65. Padlocks.

37. Gallon measure (copper).

8. The chief or only supplies required by the Shipping Master of Calcutta, the Toll Collectors of the Calcutta Canals and of the Nuddea rivers, and the Customs Collectors at Chittagong, the Orissa ports, and Naraingunge, are stationery supplies, which are obtained direct from the Superintendent of Stationery.

9. The Commissioner of Orissa reports that marine stores for the ports have hitherto been supplied by the Superintendent of Marine. It appears that the articles supplied, *viz.*, buoys, chain, spelter sheet, shackles, hawsers, flags, canvas, fire-buckets, and water-closets, cannot be procured locally.

10. The Superintendent of Stationery has informed the Board that he has submitted the report called for from him direct to Government in his No. 352B., dated 5th ultimo.

1	2	3	4	5	6
NAME OF ARTICLE.	Where now procured by this office.	Whether the articles procured by us are of Indian manufacture or not.	Where manufactured or procurable.	Where it is proposed to procure them in future.	REMARKS.
1. Almirah	Bazar ...	Indian manufacture.	......	Bazar	Where bazar is mentioned in column 5, it is intended that the article to be purchased shall be of Indian manufacture.
2. Awnings	Marine Department.	English canvas	......	Ahmuty & Co., Harton & Co.	
3. Anchors	Ditto ...	English ...	......		
4. Blank books of sizes ...	Stationery Office...	Country bound	......	Bally Mills.	
5. Brooms	Bazar ...	Indian ...	......	Bazar.	
6. Baskets for waste paper ...	Do. ...	Ditto ...	......	Do.	
7. Buckets	Marine Department.	(Iron) English	Place not given; can be had of Indian manufacture.	Ahmuty & Co., Harton & Co.	
8. Boat hooks	Ditto ...	Indian ...	......		
9. Bholeos	Ditto ...	Do. ...	......	Marine Department.	
10. Chalk	Bazar ...	English ...	......	Bazar (English).	
11. Cloth, coarse, for dusters ...	Do. ...	Indian ...	......	Bazar.	
12. Cocoanut oil	Do. ...	Do. ...	......	Do.	
13. Chairs	Do. ...	Do. ...	......	Do.	
14. Candles	Do. ...	English ...	......	Bazar (English).	
15. Coal	Marine Department.	Indian ...	......	Marine Department.	
16. Chains	Ditto ...	English ...	Place not given; can be had of Indian manufacture (iron-ware).	Ahmuty & Co., Harton & Co.	
17. Clock	Ditto ...	Do. ...	......		
18. Cooking knives	Ditto ...	Do. ...	Place not given; can be had of Indian manufacture (iron-ware).	Ahmuty & Co.	
19. Coir, yarn	Ditto ...	Indian ...	......	Ahmuty & Co., Harton & Co.	
20. Cotton, waste	Ditto ..	Do. ...	......	Ahmuty & Co.	
21. Cloth fold testing machine	Europe on indent	English ...	......	Not likely to be required again.	
22. Desk	Bazar ...	Indian ...	......	Bazar.	
23. Dungaree for dusters ...	Marine Department.	Do. ...	......	Ahmuty & Co.	
24. Dosootee cloth	Ditto ...	Do. ...	Cawn, W. Mills and elsewhere.	Ditto	
25. Deckchees	Ditto ...	Do. ...	......	Ditto.	
26. Distilling apparatus ...	Europe on indent	English ...	......	......	
27. Envelopes of sizes ...	Stationery Office	Do. ...	......	Bally Mills.	
28. File strings	Bazar ...	Indian ...	......	Bazar.	
29. Flags (ensign)	Marine Department.	Do. ...	......	Marine Department.	
30. Goose quills	Stationery Office	English ...	......	Stationery Office.	

1	2	3	4	5	6
Name of article.	Where now procured by this office.	Whether the articles procured by us are of Indian manufacture or not.	Where manufactured or procurable.	Where it is proposed to procure them in future.	**Remarks.**
31. Glass ink-pots	Ditto	Indian	......	Bazar.	
32. Gum, Arabic	Ditto	Do.	......	Do.	
33. Gunny-bags (small)	Bazar	Do.	......	Do.	
34. Gurrah cloth	Ditto	Do.	Indian manufacture established.	Do.	
35. Gauge glasses	Europe on indent	English	......	England, through Secretary of State.	
36. Do. rods	Ditto	Do.	......		
37. Gallon measure (copper)	Ditto	Do.	......		
38. Ditto ½ gallon (glass).	Ditto	Do.	......		
39. Hones	Stationery Office	Do.	......	Stationery Office.	
40. Hide	Marine Department.	Indian	......	Ahmuty & Co., Harton & Co.	
41. Hydrometers	Europe on indent	English	......	England, through Secretary of State.	
42. Ink, black and red	Stationery Office	English and Indian.	......	Dr Waldie.	
43. Inkstands (wooden)	Ditto	Indian	Glass workers, metal workers, Calcutta and Lahore.	Bazar.	
44. India-rubber	Ditto	English	......	Stationery Office.	
45. Jute	Marine Department.	Indian	......	Ahmuty & Co., Harton & Co.	
46. Leather	Stationery Office	Ditto	......	Bazar.	
47. Lamp oil	Bazar	Ditto	......	Do.	
48. Locks and keys	Do.	English	Ironware manufacture established in India.	Do.	
49. Lamps	Marine Department.	Ditto	......	Do.	
50. Life-buoy	Ditto	Ditto	......	Marine Department.	
51. Mill-boards	Stationery Office	Ditto	......	Bally Paper Mills.	
52. Mats	Bazar	Indian	......	Bazar.	
53. Needles	Stationery Office	English	Ironware manufacture established in India.	Stationery Office.	
54. Oil	Marine Department.	English and Indian.	......	Bazar.	
55. Oars	Ditto	English	......	Ahmuty & Co., Harton & Co.	
56. Paper—					
Bally, royal, double foolscap.	Stationery Office	Indian	......	Bally Paper Mills.	
Blotting	Ditto	Ditto	Bally Paper Mills		
56. Paper—					
Cartridge, white and blue	Stationery Office	English	Manufacture established in India.	Bally Paper Mills.	
Double foolscap	Ditto	Ditto	......		
Foolscap	Ditto	Ditto	......		
Foolscap, English printing	Ditto	Ditto	......		
Marble	Ditto	Ditto	......		
Note	Ditto	Ditto	......		
Brown	Ditto	Indian	Manufacture established in India.		
57. Penknives	Ditto	English	......	Stationery Office.	
58. Pasteboards	Ditto	Ditto	......	Bally Paper Mills.	
59. Paper weights	Ditto	Indian	......	Bazar.	
60. Paper-cutters	Ditto	English	......	Do.	
61. Penholders	Ditto	Ditto	......	Do.	
62. Pencils—					
(Soft)	Ditto	Ditto	......	Stationery Office.	
(Middling)	Ditto	Ditto	......	Ditto.	
(Coloured)	Ditto	Ditto	......	Ditto.	
63. Paste	Bazar	Indian	......	Bazar.	
64. Pins	Do.	English	......	Stationery Office.	
65. Padlocks	Do.	Ditto	Jessop & Co, Apcar & Co, Burn & Co.	Bazar.	
66. Paint	Marine Department.	Ditto	......	Ahmuty & Co., Harton & Co.	
67. Paint brushes	Ditto	Ditto	......	Ditto.	
68. Pan-ways	Ditto	Indian	......	Marine Department.	
69. Rulers	Stationery Office	Ditto	Apcar & Co., Jessop & Co.	Bazar.	
70. Red tape	Ditto	English	Cotton Mills, Calcutta	Do.	
71. Record stand	Bazar	Indian	......	Do.	
72. Rope	Marine Department.	English and Indian.	Ahmuty & Co.	Ahmuty & Co., Harton & Co.	Our requirements are so small that it is not desirable to send all the way to Aligarh for supplies.
73. Scissors—					
(Large)	Stationery Office	English	Aligarh Postal Workshops.	Bazar (English).	
(Small)	Ditto	Ditto			
74. Sealing wax	Ditto	Indian	......	Bazar.	
75. Steel-pens—					
(Medium)	Ditto	English	......	Do.	
(Broad)	Ditto	Ditto	......		
(Magnum Bonum)	Ditto	Ditto	......		
76. Scales, large, for weighing salt and rice.	Bazar	Indian	......	Do.	
77. Scales (very small)	Europe on indent	English	Aligarh Postal Workshops.	Do.	
78. Scrubbing brushes	Marine Department.	Ditto	......	Ahmuty & Co., Harton & Co.	
79. Soap, Dacca	Ditto	Indian	......	Bazar.	
80. Subjeemuttee	Ditto	Ditto	......	Do.	
81. Steam launches	Ditto	Ditto	......	Marine Department.	
82. Salt boat-notes	Europe on indent	English	......	England.	
83. Thread, silk	Stationery Office	Indian	......	Bazar.	
84. Twine	Bazar	Ditto	Ahmuty & Co. and elsewhere.	Do.	
85. Table	Do	Ditto	......	Do.	
86. Twine, ball	Marine Department.	English	......	Do.	
87. Do., sewing	Ditto	Ditto	......	Do.	
88. Do., do., palm	Ditto	Ditto	......	Do.	
89. Thallies	Ditto	Indian	......	Do.	
90. Thread, cotton	Ditto	Ditto	......	Do.	
91. Varnish	Ditto	English	......	Do.	
92. Wafers	Stationery Office	Ditto	......	Stationery Office.	
93. Waxcloth	Ditto	Indian	......	Bazar.	
94. Weights, sets of small, and 1 maund (brass).	Mint	English and Indian.	Roorkee Workshops	Mint.	
95. Weighing machines	Bazar	English	......	Bazar.	
96. Yarn, strength-testing machine.	Europe on indent	Ditto	......	Not required now.	
97. Do., number-testing machine.	Ditto	Ditto	......		

W. H. Grimley,
Officiating Collector of Customs.